THE IRON TRADE REVIEW

Volume XLIV CLEVELAND, APRIL 22, 1909 Number 16

MANY BUYERS

ARE MAKING INQUIRIES FOR PIG IRON

And Some Sales of Good Size Recorded—Strong Competition in Finished Material Reduces Prices.

Following the recent improvement in tonnage of finished products sold, increased business is being enjoyed in the pig iron market, but competition is keen, and very low prices are being made on northern pig iron and on finished products. The United States Steel Corporation is working 65 per cent of its capacity, with the Ensley plant still in operation.

Iron Ore Transaction

A Pittsburg firm having large iron ore and blast furnace interests, reports sales amounting to about 300,000 tons of iron ore at last year's prices, but it is understood that an exchange deal was involved, and the sales cannot be considered to mark the beginning of a buying movement, or as fixing ore prices for this year, concerning which the leading ore interests have not reached a conclusion. The appearance of the United States Steel Corporation as a seller of foundry pig iron from its Bay View, Wis., stacks has caused the expression, on the part of some merchant furnace interests having ore deposits, of their intention to consult their own interests only in participating in consultations concerning ore prices.

Pig Iron Activity

Inquiries for pig iron are much more numerous, and represent leading electric, radiator, harvester and cast iron pipe interests, as well as a vast number of smaller concerns. Sales of southern iron have continued at a satisfactory rate, and the $11 Birmingham price for No. 2 has practically disappeared. The scarcity of the lower grades of pig iron in the south is a noteworthy feature. Among important purchases were 10,000 tons by the Westinghouse Electric & Mfg. Co., and inquiries include 11,000 tons from the General Electric Co., 10,000 tons from the American Steel Foundries, and 24,000 tons from the Massillon Iron & Steel Co. The prevailing quotation in the valley is $14 for No. 2, but some interests are asking more. On the whole, the pig iron situation is much more encouraging.

Bars and Billets

The liveliest competition has developed in steel bars, and for prompt shipment 1.10c Pittsburg is the prevailing price, while on contracts up to Jan. 1, 1.15c is asked. The result of competition is especially noteworthy in reinforcing bars. Prices on bar iron are irregular. Prices of billets are also being shaded, and sales in the Chicago district have been made at about $2 below the recently announced prices.

German Competition

A striking illustration of the competition that might be expected if the tariff bars were let down is shown by the fact that on a recent order for steel pipe placed by a Canadian mining interest, German pipe makers made the low quotations at a price below the American cost of manufacture. Rail sales are not numerous. The Bethlehem Steel Co. was the lowest bidder on 6,000 tons for the Isthmian Canal Commission. The Ann Arbor system has ordered 6,000 tons, and the Manistee & Northwestern, 4,000 tons.

Structural Material.

Contracts for structural material during the past week have not been heavy, and in some districts, in which the 1.30c price had been adhered to, sales have been made at a reduction of $2. Some important railroad work is pending, including about 16,000 tons for track elevation for the Philadelphia & Reading. The general contract for the Curtis building, Philadelphia, has been let, but the order for the 15,000 tons of steel required has not been placed. The Denver & Rio Grande railroad has placed an order with the Pressed Steel Car Co. for 1,500 all steel gondolas, and the 15,000 tons of plates and shapes required will be furnished by the Carnegie Steel Co. There is some shading in prices of plates.

GARY MILL CONTRACTS AWARDED.

Pittsburg, April 21.—The Indiana Steel Co. has just awarded contracts for the new merchant mills at the Gary plant. Steel is now being erected for these mills. The contracts let are for the machinery for one 10-inch merchant mill, awarded to the United Engineering & Foundry Co., and two 12-inch merchant mills, awarded to the Pencoyd works of the American Bridge Co.

The General Electric Co. has entered the market for 11,000 tons of foundry iron for last half.

A western furnace is reported to have closed for a year's coke requirements from July, about 144,000 tons; other coke deals are being negotiated.

THE LENTZ ENGINE TO BE BUILT IN AMERICA.

The predominating influence of the fuel question in continental Europe has produced a number of high grade engines which have shown remarkable results in steam economy. The interesting announcement is made that one of these designs, the Lentz, is now to be built in America by the Erie City Iron Works, Erie, Pa., which has secured exclusive rights. A steam consumption of 12 pounds per horsepower with saturated steam, and 10.5 pounds with superheated steam is claim d for this engine.

The company has also developed a new type of vertical boiler for which strong claims are made, and of which the results of extensive tests will be made public at an early date.

THE WEEK IN IRON CENTERS

PITTSBURG.

Strong Competition on Bars—More Life in Pig Iron Market.

Office of THE IRON TRADE REVIEW,
510 Park Bldg., April 20.

The general aspect of the iron and steel market is one of sustained buying activity in most rolled products which is expressing itself in a steadily accumulating tonnage on mill books and in some increase in operation. Buyers are showing a greater degree of confidence in taking up the consideration of their future needs and are usually able to cover for their requirements in an advantageous way, although the mills are giving the preference to orders which may be specified within the next several months. A clearer understanding of the provisions of the tariff bill undergoing enactment is apparently affording greater reassurance to both consumers and makers.

Price irregularities in the market are more prominently in evidence and indicate a sharper competition for orders between some makers of finished lines. In steel bars, recent developments have brought about the practical abandonment of the 1.20c Pittsburg price which has ruled as the general price level since the beginning of the open market and 1.15c is now widely quoted. In the case of some imporant producers, a 1.10c price is being granted on business exceeding 75 tons.

In wire products, the activity of some independent companies in accumulating business at concessions from the official quotations of the principal maker is having a more disquieting effect upon the policy of the latter which has been to temporarily, at least, maintain the former prices. The report, however, that the American Steel & Wire Co. has announced a formal cut is not confirmed. The spike market has also seen aggressive selling tactics lately pursued and lower prices have resulted.

A reflection of the better tone that is characterizing conditions is to be seen in the renewed life beginning to assert itself in pig iron. A round tonnage in inquiries has appeared during the past week and sales are more plentiful. It is expected that an absorption of a considerable part of the heavy stocks in the valleys and other sections, must precede any marked improvement of the present low prices in this market.

Iron Ore.—W. P. Snyder & Co., Pittsburg, report transactions in iron ore for the season's delivery beginning May 1 which aggregate more than 300,000 tons. Of this total, sales of 100,000 tons of Bessemer and 100,000 tons of non-Bessemer have just been closed with Mahoning and Shenango valley interests. Recently the same company closed with a Pittsburg furnace for 70,000 tons of high grade Bessemer ore and with a valley interest for 60,000 tons of the same grade. It is announced that last year's prices were obtained in all cases.

Pig Iron.—A marked improvement of interest in the pig iron market on the part of consumers has appeared and inquiries for more than 75,000 tons of metal which have come out during the past week, are now before makers. Selling of northern brands is also showing some increase and the general situation has a more promising outlook.

The Westinghouse Electric & Mfg. Co. in the week closed on a block of about 10,000 tons of Nos. 1, 2 and 3 foundry iron, which was purchased from different furnaces and for various deliveries, the buyer desiring extended shipments. This transaction indicated that the going price for No. 2 foundry at present is not far from $14 valley although in exceptional instances this figure might be shaded. Sales of 1,000 tons of malleable in scattered lots and 1,000 tons of basic to an Ohio steel foundry are reported. A Pittsburg user took 1,000 tons of gray forge for prompt shipment at about $14.50 delivered. A number of smaller sales were also made.

The largest inquiry to come out in the week is from the Massillon Iron & Steel Co., Massilon, O., for 24,000 tons divided into 8,000 tons each of Nos. 2, 3 and 4 foundry and for delivery over the six months beginning May 1. The American Steel Foundries came into the market for 10,000 tons of basic for delivery at St. Louis over the balance of the year. A New York state implement manufacturer is asking prices on 10,000 tons of foundry and malleable for extended shipment. A Middletown, O., steel interest is inquiring for 5,000 tons of basic for delivery this year and another southern Ohio consumer is a prospective buyer of 2,000 tons of the same grade for similar shipment. There is a good demand for malleable and several local consumers of low phosphorus iron are inquiring on an aggregate of about 1,000 tons.

Heavy sales of southern iron continue to be made and prices are stiffening. Since the start of the present movement in that section, some large makers have closely approached the 100,000-ton mark in accumulated orders and it is believed that the general aggregate of contracts taken since April 1 is fully 250,000 tons. The southern furnace companies are now asking $11.50 Birmingham for second and $12 for third quarter delivery.

On prompt and second quarter shipment on northern iron, we quote as follows:

Bessemer, valley	$15.00 to 15.25
Bessemer, Pittsburg	15.90 to 16.15
No. 2 foundry, Pittsburg	14.90 to 15.15
Gray forge, Pittsburg	14.40 to 14.65
Basic, valley	14.25 to 14.50
Basic, Pittsburg	15.15 to 15.40

Ferro-Alloys.—Some inquiry for ferro-manganese from other sections is current but the demand from the Pittsburg district at present is light. We note a carload sale of 12 per cent ferro-silicon to a Pittsburg foundry at about $26 delivered. There is a light inquiry for 50 per cent ferro-silicon. We quote 80 per cent ferro-manganese at $41.50 to $42.50 Baltimore with a freight rate of $1.95 to Pittsburg.

Fifty per cent ferro-silicon is quoted at $58 to $59 Pittsburg on forward deliveries; domestic, 12 per cent, $26; 11 per cent, $25; 10 per cent, $24 Pittsburg.

Plates.—The Denver & Rio Grande railroad has closed with the Pressed Steel Car Co. for 1,500 all-steel side-dump gondola cars of 50 tons capacity and the plates and shapes, about 15,000 tons, will be supplied by the Carnegie Steel Co. The Pressed Steel Car Co. has also received the order of the Iowa Central for 50 side-dump steel gondolas and from the Pacific Electric railway, Los Angeles, for 50 50-ton steel underframe flat cars. The plate mills are operating at better scehdules and are regularly getting a good tonnage from the car builders, large pipe makers and structural interests. A very moderate business is going in tank steel. Some attractive orders are commanding concessions, but this shading usually does not extend beyond $1 a ton. We quote the present plate market as follows:

Tank plates, ¼-inch thick, 6¼ to 100 inches, 1.30c f. o. b. mill. Extras are as follows per 100 pounds: Boiler and flange steel plate, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches, excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end not being less than 30 inches, 0.10c; circles, 0.20c. Plates in widths over 1.10 inches

up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ¼-inch to and including 3/16-inch plate on thin edges, 0.10c; under 3/16 to and including No. 9, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Skelp.—Some odd lots in grooved steel skelp have been closed recently at about 1.20c Pittsburg which is somewhat below the recognized market of from 1.25c to 1.30c. Sheared steel skelp is quoted at from 1.30c to 1.35c. Iron skelp makers, particularly those in the middle western section, have their outputs well sold up.

Sheets.—Independent sheet makers at a meeting in this city last week, discussed general conditions, but took no action of importance to the trade. The mills are booking a very fair volume of orders and are making steady shipments, as consumptive demands have increased. The price situation shows no change, for, while black sheets are firm, there is considerab'e irregularity on plain galvanized and corrugated roofing. The leading interest continues to operate 105 or 60 per cent of its 176 sheet mills. The independent mills have no large amount of manufactured stock on hand and are running at a higher percentage. We quote present minimum prices as follows:

Blue annealed sheets, Nos. 10 and heavier, 1.60c; Nos. 11 and 12, 1.65c; Nos. 13 and 14, 1.70c; Nos. 15 and 16, 1.80c; box annealed sheets, Nos. 10 to 12, 1.85c; Nos. 13 and 14, 1.90c; Nos. 15 and 16, 1.95c; Nos. 17 to 21, 2c; Nos. 22 to 24, 2.05c; Nos. 25 and 26, 2.10c; No. 27, 2.15c; No. 28, 2.20c; No. 29, 2.25c; No. 30, 2.35c; galvanized sheets, Nos. 13 and 14, 2.30c; Nos. 15 and 16, 2.40c; Nos. 17 to 21, 2.50c; Nos. 22 to 24, 2.65c; Nos. 25 and 26, 2.85c; No. 27, 3.05c; No. 28, 3.25c; No. 29, 3.35c; No. 30, 3.60c; painted roofing sheets, $1.55 per square for No. 28 gage, 2½-inch corrugation, and galvanized roofing sheets, $2 80 per square for No. 28 gage, 2½-inch corrugation.

Tin Plate.—Mill orders in tin plate are heavy and makers generally are working their plants close to capacities. New business is of moderate volume, but some contracts to the end of the year are being taken at current prices which are quite uniform. The operations of the American Sheet & Tin Plate Co. are unchanged, being 202 mills active, which represent 83 per cent of total and 94 per cent of the serviceable equipment of the company. Most of the independent mills are running full. We quote the present market as follows:

Coke tin plate, 100-pound basis, 14 x 20, $3.45 f. o. b. mill Pittsburg district and $3.40 in large lots. Terms, 30 days, less 2 per cent for cash in 10 days.

Rails and Track Material.—Some small tonnages of standard sections are being placed by different railroads. The Carnegie Steel Co. has taken 3,000 tons from the Norfolk & Western for prompt shipment, and is closing for 5,000 tons with another line. The light rail trade is showing little change, about 1,500 tons having been placed with the leading interest this week. Light rail prices are subject to considerable shading. The heavy buying of track fastenings continues. Considerable irregularity has lately developed in the spike market through spirited competition for business, and prices have been scaled down, particularly in hand spikes, so that 1.60c Pittsburg has been done. On present specifications on Bessemer rails we quote as follows, the base price for open-hearth rails being $30 mill:

Fifty-pound and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; 8-pound, $32; 12-pound, $28; 16-pound, $26; 20-pound, $25; 25 to 45-pound, $24; angle splice bars for standard sections, 1.50c. Standard spikes, 1.60c to 1.70c Pittsburg; hand spikes, 1.60c to 1.70c Pittsburg.

Steel.—Sheet and tin plate manufacturers are consuming a heavy tonnage of sheet and tin bars and their specifications against their contracts with the steel mills are very liberal. The Carnegie Steel Co. is receiving a very substantial tonnage of steel orders from the American Sheet & Tin Plate Co. and other subsidiaries of the United States Steel Corporation. Billet contracts are also being freely drawn against. While current prices are being shaded on odd lots for quick shipment, the regular quotations are being well observed on contracts and full prices are being obtained on some quantities for immediate delivery.

Bessemer and open-hearth 4 x 4 billets with 0.25 carbon and less are quoted at $23 Pittsburg, with the usual extras for size and analysis, and forging billets at $25 Pittsburg. Sheet and tin bars are $25 Pittsburg. Some steel makers are still willing to divide the freight within the $1 limit, making the price in the immediate Pittsburg territory $23.50 delivered on billets and $25.50 delivered on sheet bars.

Hoops and Bands.—Business being offered in hoops which is not especially heavy is being subjected to sharp competition among manufacturers, and this condition is bringing out prices under the 1.60c level. Specifications against contracts are fair. The present market is regularly quoted as follows:

Hoops in carload lots, 1.60c; in less than carload lots, 1.70c; bands, 1.20c, base half extras as per standard steel.

Merchant Bars.—Interesting events of price significance have transpired in the steel bar market during the past week, and have resulted in the practical abolishment of the 1.20c Pittsburg base in favor of 1.15c Pittsburg. One of the leading makers of steel bars has become aggressive for business and is quoting quite freely a 1.10c Pittsburg price which applies particularly to orders for quick shipment, although it is likely this figure may be done for extended shipment. The 2,000 tons of reinforcing bars in the Queen Lane water works contract, Philadelphia, are reported to have been taken by this interest the past week at 1.10c Pittsburg, although in this case it was necessary to meet the competition of the rerolling mills. Other leading steel bar producers are generally quoting 1.15c Pittsburg for deliveries up to the end of the present year. The ordering activity of bar consumers is holding up strongly, and the April tonnage is substantially increasing over March, which was a very good month in this respect. The larger implement manufacturers are exercising caution in closing for their extended requirements, although the contracts of several of the smaller companies have been taken by the mills. Bar iron is dull, and makers are not disposed to obligate themselves on future deliveries because of the uncertainties of the scrap market. We quote present prices as follows:

Common iron bars, 1.30c to 1.35c Pittsburg; Bessemer and open-hearth steel bars, 1.10c to 1.15c; plow and cultivator, 1.10c to 1.15c; channels, angles, zees, tees, under 3-inch, 1.30c, all f. o. b. mill. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size, 0.30c advance. Cold rolled and ground shafting, 60 per cent in carloads, and 55 per cent in less than

carloads, delivered in base territory. Planished and machine straightened tire steel is 1.40c base; iron finished tire under 1½ by 1½ inches, 1.35c, both plus ½ extra on tire card; iron finished tire, 1½ by ½ and over, 1.20c, plus ½ extra on the steel bar card.

On cold rolled strip steel, width 1½ inches and wider, and 0.100 inch and thicker, we quote base prices for 100 pounds, $3.05 on hard, and $3.30 on soft.

Structural Material.—A number of structural projects in this section are beginning to assume definite form and some contracts are expected to be placed shortly. One of the largest undertakings in sight is for a new public bridge over the Ohio river at Sewickley, Pa., which will require from 6,000 to 8,000 tons of steel. Plans are nearing completion and bids will be asked for soon. Figures are being considered for the additions to the pipe mills of the Youngstown Sheet & Tube Co., which will require about 1,200 tons, and an award is about to be made. Bids will be taken this week on the redrawn plans for the Wilkinsburg high school, 800 tons, and on April 30 for the West Penn hospital, 1,200 tons, in this city, the original drawings of which have also been revised. The contract for the Pittsburg Athletic Association, 1,400 tons, is about to be awarded. The Buffalo, Rochester & Pittsburg railroad is expected to close shortly on its yearly requirements of bridge work, about 2,500 tons. The railroads generally having awarded considerable tonnage during the past month are not inquiring so freely, but building work in other lines is quite active. The structural mills are receiving good orders. Attractive business is bringing out prices of 1.25c and lower on plain material. We quote the present market as follows:

Beams and channels, 15-inch and under, 1.25c to 1.30c; over 15 inches, 1.35c to 1.40c; zees, 1.25c to 1.30c; tees, 1.30c to 1.35c; angles, from 3 to 6 inches, 1.25c to 1.30c; over 6 inches, 1.35c to 1.40c; universal and sheared plates, 6¼ inches and wider, 1.25c to 1.30c.

Merchant Pipe.—On a recent inquiry for a quantity of 12-inch steel pipe for the Cobalt Canada mining district, German pipe makers offered the low quotations and took the business at a price reported at from 10c to 25c per foot below the American cost of manufacture. There is a greater demand for merchant pipe from the jobbers, for, as consumption is increasing, the latter are ordering more confidently in greater assortment, but cases of normal stocks being taken are rare. A number of large undertakings are developing in line pipe, but no additional contracts of importance have been placed. The National Tube Co. continues to operate six blast furnaces, and its operations at the Lorain plant have been interrupted somewhat lately by its steel making capacity running ahead of its pig iron supply. Merchant pipe prices are firm, and quotations on line pipe are more uniform. We quote the following official discounts on merchant pipe subject to five off to jobbers, while a few of the very large jobbers with mill connections are given an additional one point off:

	—Steel—		—Iron—	
	Black.	Galv.	Black.	Galv.
⅛ and ¼ inch	72	56	69	..
⅜ inch	73	59	70	56
½ inch	76	64	73	61
¾ to 6 inch	80	70	77	67
7 to 12 inch	75	60	72	57
PLUGGED AND REAMED.				
1 to 4 inch	78	68	75	65
EXTRA STRONG PLAIN ENDS.				
⅛ to ⅜ inch	65	53	62	50
½ to 4 inch	72	60	59	57
4½ to 8 inch	68	56	65	53
DOUBLE EXTRA STRONG PLAIN ENDS.				
½ to 8 inch	61	50	58	47

Boiler Tubes.—The general situation in merchant tubes is changing very slowly and a quiet state of market prevails. Locomotive tubes are moving fairly well. There is some irregularity in tube prices. We quote the following official discounts on lap-welded steel boiler tubes to jobbers in carloads:

1 to 1½ inch	50
1¾ to 2¼ inch	62
2½ inch	64
2¾ to 5 inch	70
6 to 13 inch	62

2½ inch and smaller, over 18 feet, 10 per cent net extra.

2¾ inch and larger, over 22 feet, 10 per cent net extra.

To destinations east of the Mississippi river will be sold at delivered discount for carloads lowered by two points, for lengths 22 feet and under; longer lengths, f. o. b. Pittsburg.

We quote the following official discounts on charcoal iron tubes to jobbers:

1 to 1½ inch	45
1¾ to 2¼ inch	45
2½ inch	50
2¾ to 5 inch	57
6 to 13 inch	45

Wire Products.—The current report that the leading wire interest has announced a formal reduction of $2 a ton in its products is not confirmed in this territory, and the former official quotations, which have been considerably shaded recently, still prevail. The several independent interests which granted concessions of about $2 a ton on nails and wire have been accumulating a very comfortable tonnage on their books, and are not able to guarantee deliveries much before June 1 in some cases. A meeting of the sales managers of the leading interest was held in this city the past week to discuss plans for meeting this competition. Present official prices are as follows:

Wire nails, jobbers' carload lots, $1.95; retailers' carload lots, $2; painted barb wire, jobbers' carload lots, $2.10; retailers' carload lots, $2.15, with 30c for galvanizing; plain wire to jobbers in carloads, $1.80, and to retailers in carloads, $1.85.

Wire Rods.—Though there is little business in wire rods being negotiated, some low quotations are heard of in connection with recent inquiries, and we quote $29 Pittsburg on Bessemer and $30 Pittsburg on open-hearth rods.

Coke.—A greater buying activity in both furnace and foundry coke is to be noted. Some large transactions in furnace coke are being made, and a valley furnace has just closed for its requirements from July to December of approximately 90,000 tons at about the quoted market. The Westinghouse Electric & Mfg. Co. this week awarded a foundry coke contract calling for its one year's requirements from July to July, totaling about 10,000 tons, at a shade less than $2 ovens. A number of foundries are making contracts for their extended requirements. We quote spot furnace coke at from $1.50 to $1.75 ovens, and on contract from $1.75 to $1.90 ovens. On first-class Connellsville foundry coke, the range is from $1.80 to $2 ovens for prompt shipment, and on contract from $1.90 to $2.25 ovens. The *Courier's* figures for the week ending April 10 show 22,058 ovens active with an output of 233,718 tons, compared with 22,273 active ovens and a production of 245,450 tons the previous week.

Old Material.—The market in old material gives the appearance of being close to bottom. Prices are holding steady, for, while the demand is not especially increasing, the offerings are not excessive. There is a tendency on the part of dealers to ask higher prices and not to release much of their accumulations at the present level. The Baltimore & Ohio, Norfolk & Western, Lake Shore and Pennsylvania railroads, which closed the past week on their March lists, were all able to obtain higher prices. The iron mills and foundries are taking little scrap and the open-hearth plants in this territory all appear to be in a very comfortable position. We quote gross tons delivered in the Pittsburg district as follows:

Heavy melting scrap, $13.75 to $14.25; re-rolling rails, $14.25 to $14.50; bundled sheet scrap, $11.25 to $11.75; iron axles, $18 to $19; old iron rails, $15 to $16; No. 1 wrought scrap, $13.25 to $13.75; old car wheels, $14 to $14.50; low phosphorus, $16 to $16.50; machine shop turnings, $8 to $8.50; cast borings, $7 to $7.50; No. 1 cast scrap, $13.50 to $14; malleable, $13 to $13.50; stove plate, $10.50 to $11.

CHICAGO.

Record Breaking Business of the Leading Interest—Very Low Prices.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Bldg., April 20.

The showing of the leading steel making interest in this market as reported for the period since the first of this year may be acepted as representing a general condition with regard to tonnage, though not applicable to the same extent in all directions. The specifications and orders taken by this interest show a weekly margin of 3,000 tons over any previous bookings. The highest weekly tonnage heretofore attained was 32,000 tons, a record made in 1907. In view of the absolute dullness in finished lines at the beginning of the year, this showing indicates how great the activity has been since the reductions in prices. The market just now reveals a very low level of prices for finished materials and open market quotations, Pittsburg basis, of $21 on rolling billets, $1.22 on shapes and plates and $1.15 on steel bars are acknowledged. If anything, however, a greater firmness is discernible at these levels and in the matter of fabricated material prices there are indications of a rebound from the lowest prices. It is understood that the Ambridge and Pencoyd shops of the leading interest are now well taken care of and its other shops are in fairly good shape. The smaller buyers of pig iron have contributed a comfortable aggregate of tonnage during the week following the larger sales. The general price level for southern iron has advanced 50 cents a ton and a larger quantity of northern iron has been in demand. The scrap market is assuming a stronger position.

Pig Iron.—Numerous sales are reported for the past week in lots up to 2,500 tons, though the general character of the buying represented the aftermath of the large sales made in the preceding week. Many small buyers were influenced to take on some tonnage by the withdrawal of the low price of $11 for the last half. The lowest ruling price in this market at present for No. 2 southern iron is $11.50 for last half delivery. But one interest offers this price, most of the other furnaces asking $12 for the last quarter. A slightly increased demand for northern iron is noticeable. Delivered prices based on $14 at the furnace with a freight rate of $2.40 into this territory govern the price at which local business is being placed. Favored brands probably command a little better than this but $16.50 at local furnace seems to be the extent of the premium obtainable. We quote as follows:

Lake Superior charcoal	$19.50 to 20.00
Northern foundry No. 1	17.00 to 17.50
Northern foundry No. 2	16.40 to 16.85
Northern foundry No. 3	16.00 to 16.50
Southern foundry No. 1	16.35 to 16.85
Southern foundry No. 2	15.85 to 16.35
Southern foundry No. 3	15.35 to 15.85
Southern foundry No. 4	14.85 to 15.35
Southern No. 1 soft	16.35 to 16.85
Southern No. 2 soft	15.85 to 16.35
Southern gray forge	13.85 to 14.35
Southern mottled	13.60 to 14.10
Southern silveries, 4 per cent silicon	17.60 to 18.10
Southern silveries, 5 per cent silicon	18.10 to 18.60
Southern silveries, 6 per cent silicon	18.60 to 19.10
Jackson Co. silveries, 6 per cent.	19.40 to 19.90
Jackson Co. silveries, 8 per cent.	20.40 to 20.90
Jackson Co. silveries, 10 per cent	21.40 to 21.90
Malleable Bessemer	16.40 to 16.85
Standard Bessemer	17.00 to 17.50
Alabama basic	16.35 to 16.85

Merchant Pipe and Boiler Tubes.—There is a gradual increase in the tonnage of steel pipe resulting largely from increased building operations. Boiler tubes for locomotives are moving better, but there is little demand from boiler makers in this territory. Out of store lap weld tubes are selling at 65 off and charcoal at 50 off.

Cast Iron Pipe.—There is a probability that the contract placed by the city of Cheyenne may be increased by 5,000 tons. At Salt Lake City an award of 2,000 tons is pending and at Dayton, O., 500 tons. Prices remain unchanged and we quote as follows:

Four-inch water pipe, $27.50; 6 to 14-inch, $26.50; larger sizes, $25.50; gas pipe, $1 a ton higher.

Wire Products.—The manner in which the tonnage of wire products is maintained continues to be very gratifying. On barb wire, two weeks is the best delivery that can be given by some interests. The larger part of the output is being sold at full prices, but some concessions continually appear necessary. The prospect is for a more extended spring season than usual. We quote for Chicago delivery as follows:

Wire nails, jobbers' carload lots, $2.13; retailers' carload lots, $2.18; painted barb wire, jobbers' carload lots, $2.28; retailers' carload lots, $2.33, with 30c for galvanizing; plain wire to jobbers in carloads, $2.03. Wire rods, Bessemer, $33; open-hearth, $34; chain rods, $33, f. o. b. Pittsburg.

Billets.—Within the last ten days the real strength of the billet market has been developed by several transactions, some of them involving a considerable tonnage. From these it has been shown that the market is openly on a basis of $21 Pittsburg for rolling billets with the usual spread of $2 for forging billets. In this market, several sales, including one for 500 tons, were made at $25 for forging billets. There was a marked increase in the billet tonnage during the week and numerous sales were reported without much variation from the above price. We quote for 4 x 4-inch rolling billets, $24, and for forging billets, $26, Chicago base.

Merchant Bars.—Bar iron specifications are not heavy and the prices which are obtained vary from the basis of 1.30c, depending upon the circumstances of each sale. With steel bars selling as close to that price as they have been in the past few days, the preference for iron must be pronounced to bring an equal price. The leading interest reports heavy steel bar specifications, among them being an order for 8,000 tons. The market generally is resting at 1.33c for bars on contracts through the remainder of the year with some slight variation either way. Deliveries extending beyond Jan. 1 command a premium of $2 a ton. An order for 600 tons of open-hearth steel bars for an important implement interest is pending. On hard steel angles the market is clearly at from 1.22½ to 1.25c Chicago. We quote as follows:

Bar iron, 1.30c; soft steel bars and bands, 1.33c to 1.35c, half extras; soft steel angles, less than 3 x 3, 1.48c; hoops, 1.78c base, full extras; planished or smooth finished tire steel, 1.58c; iron finish, up to 1½ x ½-inch, 1.53c base tire card; iron finish, 1½ x ½-inch and larger, 1.38c base steel card; channel for solid rubber tire, ¾ to 1 inch, 1.88c and 1⅛-inch and larger, 1.78c; smooth-finished machinery steel, 1.63c; flat sleigh shoe, 1.43c; concave and convex sleigh shoe, 1.63c; cutter shoe, 2.75c; toe calk steel, 1.93c; railway spring, 1.73c, base steel card; vehicle spring steel, 1.78c base vehicle card; crucible tool steel, 7c to 9c, with higher prices asked on special grades. Quotations on shafting are 60 per cent off the list for carload lots, and 55 per cent off for less than carload lots, carload freight allowed to points in base territory. On iron and steel bars from local stocks, we quote as follows: Bar iron, 1.70c to 1.80c, full extras; soft steel bars, 1.50c per 100 pound base, plus half extras; soft steel hoops, 2.10c, full extras.

Plates.—The accentuation of the pressure on prices in the past fortnight is shown in the matter of plate prices which have weakened from the basis of 1.45c Chicago. Desirable business in various tonnages has been taken in several instances as low as 1.40c Chicago. Prices $1 a ton below this are reported, but for these no substantiation can be found and it seems quite unlikely that as low

as this has been done. On shipments to this territory, $1.25 Pittsburg has been done freely on all classes of business. The aggregate tonnage moving, largely for structural purposes, continues very good. For mill prices, see Pittsburg report. Freight to Chicago, 18 cents. We quote from local stocks as follows:

Tank steel, ¼-inch and heavier, up to 72 inches wide, 1.60c to 1.70c, from 72 inches wide to 95 inches wide, 1.70c to 1.80c; 3/16-inch up to and including 60 inches wide, 1.70c to 1.75c; 72 inches wide, 1.95c to 2c; No. 8 up to 60 inches wide, 1.70c to 1.75c. Flange and head quality, 25c extra.

Sheets.—The volume of the trade in sheets is well maintained, although a further weakening in prices is reported from the southwest. In this market, the local mill is running full. We quote prices unchanged as representative of the top of the market. For mill prices, see Pittsburg report. Freight to Chicago, 18 cents. We quote store prices at Chicago as follows:

Store prices at Chicago: No. 10, 2c to 2.10c; No. 12, 2.05c to 2.15c; No. 14, 2.10c to 2.20c; No. 16, 2.20c to 2.30c; Nos. 18-20, 2.50c to 2.55c; Nos. 22-24, 2.55c to 2.60c; No. 26, 2.60c to 2.65c; No. 27, 2.65c to 2.70c; No. 28, 2.75c to 2.80c; No. 30, 3.05c; galvanized sheets, Nos. 10 to 16, 3c to 3.10c; Nos. 18 to 20, 3.05c to 3.15c; Nos. 22 to 24, 3.20c to 3.25c; No. 26, 3.40c to 3.45c; No. 27, 3.60c to 3.65c; No. 28, 3.80c to 3.90c; No. 30, 4.20c to 4.50c.

Structural Steel.—The market is undoubtedly experiencing the lowest prices at present that it has thus far on plain material and there is good reason to believe that the bottom limit of those interests most likely to establish the low water mark has been about reached. Sales of material are being made on the basis of 1.22c Pittsburg, or 1.40c Chicago, and this is recognized as the market price. Reports indicate that the most desirable business would not bring out a price better than 1.20c Pittsburg. Prices on fabricated material are inclined upward. As a matter of record, it may be stated that a price as low as $35 a ton has been made, but can no longer be done. There has been no sharp advance, but the large tonnage which has been placed recently has relieved the situation so far as those interests are concerned which have been making the lowest prices, and the excellent prospect for the coming season, which offers some 200,000 tons including 60,000 tons of bridge work, has materially strengthened the situation. Among the inquiries now pending is 2,800 tons for the Chicago, Rock Island & Pacific bridge work, 400 tons for a bascule bridge for the Santa Fe at Galveston, and 360 tons for five bridges for the Sanitary District at Chicago. The contracts placed during the week were not very numerous, but include 2,500 tons for steel transmission towers for the Great Falls Water Power & Townsite Co. The steel was galvanized and the aggregate value of the order was about $150,000. The Westlake Construction Co., of St. Louis, secured the general contract for the city hall for Indianapolis, in which will be some 12,000 tons. McClintic-Marshall & Co. took 200 tons of steel tank towers for the Chicago & Northwestern, and the King Bridge Co., of Cleveland, will furnish 250 tons for the Great Northern railway at St. Paul. Wells Bros. will handle the erection of 700 tons of steel in the addition to the Republic building in this city, the proposed warehouse for which Carson, Pirie, Scott & Co. are obtaining figures, if built of structural steel, will require about 5,500 tons, and a proposed coal handling plant for the Philadelphia & Reading Coal Co. will take some 1,500 tons. For mill prices on plain material, see Pittsburg report. Freight to Chicago, 18 cents. We quote from local jobbers' stocks as follows:

All angles, 3 inches and larger, including 6 inches, $1.60 per 100 pounds; angles over 6 inches, $1.70 per 100 pounds base; beams, 3 to 15 inches, inclusive, $1.60 per 100 pounds, base; channels, 3 inches and larger, $1.60 per 100 pounds base. Less than carload lots are $1 a ton higher than foregoing prices.

Rails and Track Supplies.—While no sales of importance are reported, inquiry from western territory for heavy section rails is very attractive. Particularly are traction interests active in securing estimates. The Marlum Co., of Kansas City, has out an inquiry for 7,700 tons presumably for traction purposes. A number of the western roads should be buying rails, but they seem content to specify in small quantities as the rails are actually required. An order for 15,000 tons for a Montana road is pending and the Soo line is considering the building of a 126-mile extension. The transfer of the Wisconsin Central to the Soo line has been completed and it is now known as the Chicago division of that line. Competition for light rail business is very keen and as low as $23 a ton has been done. The Gary rail mill has demonstrated something of its size already and though running under a light schedule, it has for short periods turned out rails at the rate of 4,500 tons a day. A remarkable record has also been made in the percentage of seconds, considerably below 5 per cent having been accomplished. For prices on standard sections, see Pittsburg report. We quote as follows:

Light rails, 25-pound to 45-pound, $24; 20-pound, $25; 16-pound, $26; 12-pound, $27. Track supplies, f. o. b. Joliet, angle bars, 1.50c to 1.60c; spikes, 1.80c to 1.90c; track bolts, with square nuts, 2.15c to 2.20c; with hexagon nuts, 2.30c to 2.40c; small railroad and square boat spikes, 1.90c base, f. o. b. Chicago.

Old Material.—The increased inquiry, especially for steel scrap and cast scrap, has brought an apparently substantial tone of strength to the market. This is most noticeable in the approved prices which are being obtained for railroad offerings. Inquiry for cast scrap has been very active in the past week and local consumers have taken considerable quantities of short rails, heavy melting steel and similar grades. There is a limited demand for boiler punchings. We have revised our prices and quote gross tons in the first paragraph as follows:

Old car wheels	$14.00 to 14.50
Old iron rails	16.25 to 16.75
Re-rolling rails (4 ft. and over)	13.50 to 14.00
Old steel rails (4 ft. and under)	14.00 to 14.50
Light section relayers, 45 lbs. and under, subject to inspection	21.00 to 23.00
Relaying rails, subject to inspection	19.00 to 19.50
Frogs switches and guards	12.50 to 13.00
Heavy melting steel	13.00 to 13.50

We quote, net tons, as follows:

No. 1 R. R. wrought	$12.00 to 12.50
No. 2 R. R. wrought	11.00 to 11.50
Knucklers, couplers and springs	11.75 to 12.25
Shafting	15.25 to 15.75
Iron car axles	17.00 to 17.50
Steel car axles	16.50 to 17.00
Dealers' forge No. 1	9.50 to 10.00
Pipes and flues	8.50 to 9.00
No. 1 cast, 150 lbs. and less	12.75 to 13.25
No. 1 mill	7.00 to 7.50
Mixed busheling (Nos. 1 and 2)	7.50 to 8.00
Country sheet	5.00 to 5.50
No. 1 boiler cut	9.00 to 9.50
Boiler punchings	12.00 to 12.50
Cast borings	5.25 to 5.75
Mixed borings, etc.	5.25 to 5.75
Machine shop turnings	6.50 to 7.00
Railroad malleable	11.50 to 12.00
Agricultural malleable	10.50 to 11.00
Stove plate and light cast scrap	11.25 to 11.75
Old iron splice bars	14.50 to 15.00

CLEVELAND.

Iron Ore Price Discussion—Heavy Increase in Pig Iron Business.

Office of THE IRON TRADE REVIEW, Browning Building, April 20.

Iron Ore.—No sales are reported, but reserves of large tonnages continue to be made. Most of the furnace owners are advocating a reduction on the price of ore, but it is un-

certain what action will be taken. The appearance of the United States Steel Corporation as a seller of foundry iron from its Bay View, Wis., stacks will probably have the tendency of preventing independent interests from giving as much consideration as has been done in the past to the wishes of the Steel Corporation in regard to iron ore prices. At the meeting held in Cleveland, at which the prices of ore were originally fixed for 1908, President Corey made an address in which he stated that the Steel Corporation did not intend to go into the business of selling pig iron. This was considered a veiled intimation of what might be done, however, in case the ore prices were not reaffirmed. Mr. Corey's wishes were then complied with, although later in the season the prices were reduced. Independent interests are now showing a disposition to consult their own welfare only, as they say that the Steel Corporation can no longer expect co-operation on their part.

The labor unions on the lakes are lining up to make a fight against the establishment of the open shop. The Pittsburg Steamship Co. started one vessel, the John W. Gates, last Saturday, and others are to follow, but other companies are not showing any disposition to start their vessels, and probably will not do so for some weeks. Vessels which have sailed have met with some hostility from the unions, but have had no difficulty in getting all the employes needed. The first clearance made from Gary was that of the steamer John Lambert, which sailed for Superior April 19, with 2,300 tons of rails.

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $4.50; Mesabi Bessemer, $4.25; old range non-Bessemer, $3.70; Mesabi non-Bessemer, $3.50.

Pig Iron.—Greatly increased activity in both inquiries and sales has developed within a few days. A number of the largest melters in the country have been represented, and in spite of the very low prices prevailing, the situation is more encouraging. The leading pipe interest has purchased 6,000 tons for delivery over a period of six months, beginning May 1. A Barberton concern bought 4,000 tons. The Westinghouse interests have also placed a large tonnage. A Massillon cast iron pipe concern is in the market for 24,000 tons; the International Harvester Co. is inquiring for 1,200 tons for its Akron, O., plant; the leading radiator interest is in the market, and many other minor concerns are making inquiries, so that the total tonnage being figured on by Cleveland interests amounts to at least 60,000. The prevailing price is $14 valley for No. 2, and while it has probably been shaded in some cases, it is also true that some interests are not selling as low as $14. We quote, delivered in Cleveland, as follows:

No. 1 foundry	$15.00 to 15.50
No. 2 foundry	14.50 to 15.00
No. 3 foundry	14.00 to 14.50
No. 2 southern	15.35 to 15.85
Gray forge	13.75 to 14.00
Bessemer	15.90 to 16.15
Lake Superior charcoal	19.00 to 19.50
Jackson Co. 8 per cent silvery	20.05

Coke.—Very little business is being done in this territory, and prices are unchanged. Spot furnace coke we quote at $1.50 to $1.65 at the ovens, and on contract $1.65 to $1.75. For first class Connellsville foundry coke we quote on shipments up to the second half $2 to $2.25.

Finished Materials.—The activity in pig iron has also been shown in finished material, but competition is very keen and low prices are being made. On steel bars 1.10c has been done, even on carload lots for prompt shipment; but it is doubtful whether a smaller amount than 75 tons can now be purchased at that figure, while on contract to Jan. 1, 1.15c is the prevailing price. Prices on plates and shapes are also being cut, and on desirable tonnage, 1.20c is being done. Both of the Cleveland mills are in operation, and there is somewhat improved demand for bar iron, on which the price is 1.25c Cleveland, for shipment to competitive points, while a somewhat higher price is obtained for Cleveland delivery. On twisted reinforced bars, the usual extras are not always charged, and very low prices prevail. The county commissioners are expected to award the contract for the Denison-Harvard bridge within a few days. The 2,500 tons of steel for the Engineers' building went to the Lackawanna Steel Co., in accordance with a reciprocity arrangement. The leading interest has, during the past week, taken orders for about 5,000 tons of material, of which a considerable part consisted of steel bars. Among the contracts awarded were the erection of the Bailey building on Euclid avenue, about 1,000 tons, to the Forest City Iron & Steel Co., the steel to be furnished by the Jones & Laughlin Steel Co., and 400 tons of twisted reinforcing bars for the same building, awarded by the Reaugh Construction Co. to a company not announced at a very low price. An independent interest took an order for 800 tons of structural material for stock from an erecting company.

Old Material.—The situation remains about the same as last week, while the demand has not increased. Sellers are holding their material with confidence that prices will decrease. We continue to quote f. o. b. Cleveland as follows:

Old iron rails	$14.50 to 15.00
Old steel rails (re-rolling)	13.50 to 14.00
Old steel rails (under 6 feet)	13.50 to 14.00
Old car wheels	14.50 to 15.00
Old steel boiler plate	11.00 to 11.50
Malleable iron (railroad)	12.50 to 13.00
Steel axles	17.00 to 17.50
Malleable iron (agricultural)	11.50 to 12.00
Heavy steel	12.00 to 12.50
Country mixed steel	11.00 to 11.50
Low phosphorus	16.00 to 16.50

We quote, net tons, as follows:

No. 1 R. R. wrought	$12.00 to 12.50
No. 1 busheling	10.00 to 10.50
No. 1 machine cast	12.50 to 13.00
Iron axles	16.00 to 16.50
Axle turnings	8.50 to 9.00
Machine shop turnings	6.50 to 7.00
Grate bars	10.50 to 11.00
Pipes and flues	10.00 to 10.50
Tank iron	9.00 to 9.50
Hoop and band iron	7.00 to 7.50
Sheet iron	5.50 to 6.00
Wrought drillings	6.50 to 7.00
Stove plate	10.50 to 11.00
Cast borings	6.00 to 6.50

CINCINNATI.

Prices on Southern Iron Firmer Than on Northern—Fair Inquiry.

Office of THE IRON TRADE REVIEW,
First National Bank Bldg., April 20.

Pig Iron.—There is still considerable interest in pig iron for deliveries over the last half of the year. A large consumer at Canton, Ill., bought 3,000 to 4,000 tons of malleable iron in the Ironton district, on which the price was close to $14 at furnace. Michigan stove interests bought one lot of 450 tons and one of 1,000 tons of northern and southern for last half. An Indiana melter took 700 tons northern and southern. An Ohio melter bought 400 tons northern and 200 tons of southern, for third quarter. A local concern bought 800 tons of southern for last half. There is an inquiry for 1,000 tons of basic for early delivery. Several large consumers are in the market for last half requirements, which, if closed, will amount to considerable tonnage. A melter in southern Ohio is asking for quotations on 2,000 tons, half northern and half southern, for last half. There is also a fairly good scattering inquiry for smaller lots. Southern iron is firmer to the extent that only one southern producer is now credited with quoting $11 Birmingham for the last half. Only two are quoting $11 for second quarter. The other southern furnaces are now naming $11.50 or higher for last half and

$11.25 to $11.50 for second quarter. There is not much call for second quarter or prompt shipment iron. There is some talk of price shading by the furnaces in southern Ohio and the $14 furnace price for No. 2, while not openly shaded, is the subject of suspicion. The market has the appearance of being stronger for southern iron than for northern and the tendency seems to be toward a slightly higher level for southern iron. We quote for prompt shipment and for second quarter, delivered Cincinnati based on freight rates of $1.20 from Ironton and $3.25 from Birmingham, as follows:

Southern foundry No. 1	$14.75 to 15.25
Southern foundry No. 2	14.25 to 14.75
Southern foundry No. 3	13.75 to 14.25
Southern foundry No. 4	13.25 to 13.75
Southern No. 1 soft	14.75 to 15.25
Southern No. 2 soft	14.25 to 14.75
Southern gray forge	13.25 to 13.50
Northern No. 1 foundry	15.70 to 16.20
Northern No. 2 foundry	15.20 to 15.70
Northern No. 3 foundry	14.70 to 15.20
Northern 8 per cent silicon	19.70

Finished Material.—Specifications on contracts are fairly good and there has been no concession made in prices at which the material specified is to be billed by some of the companies. This does not relieve the market from persistent rumors of lower than recognized schedules being named, however, and the situation is considerably unsettled.

Coke.—There is more interest shown by the foundries in contracting for their requirements for the last half of the year and for one year periods from July 1. The present prices seem attractive and some foundries are taking on these contracts. To this extent, there is more interest in the market, but the calls for coke on existing contracts do not improve materially. The following prices represent the range of prices on contract and spot coke. The outside figures are asking prices on contracts and the inside prices are spot coke quotations.

	PER TON.
Wise county furnace coke	$1.60 to 1.90
Wise county foundry coke	2.00 to 2.25
Pocahontas furnace coke	1.65 to 1.85
Pocahontas foundry coke	1.85 to 2.25
Standard Connellsville furnace coke	1.50 to 2.35
Standard Connellsville foundry coke	1.90 to 2.35

Old Material.—The market is still somewhat irregular, but quotations are unchanged. There is more scrap selling and some grades are stronger. We quote dealers' prices here as follows:

Old No. 1 R. R. wrought, net tons	$13.50 to 14.00
No. 1 machinery, net tons	13.00 to 13.50
Old iron rails, gross tons	15.50 to 16.50
Old steel rails (re-rolling) gross tons	13.50 to 14.00
Old short lengths, gross tons	12.00 to 13.00
Old iron axles, net tons	15.50 to 16.50
Heavy melting scrap, gross tons	12.00 to 12.50
Stove plate, net tons	11.00 to 11.50
Heavy turnings	7.50 to 8.00
Cast borings, net tons	4.50 to 5.50
Car wheels, gross tons	13.50 to 14.50

PHILADELPHIA.

General Contract for Curtis Building Let—Pig Iron Activity Has Increased.

April 19.

Pig Iron.—The improved activity noted a week ago has continued and increased. A very attractive volume of inquiry is now current, chiefly for delivery up to July 1, but in occasional instances over the remainder of the year, and sales made during the week aggregated at least 10,000 tons. An inquiry is still pending for a lot of 7,500 tons of low grade southern iron for a local pipe founder, who recently took on 3,000 tons of northern pipe-making iron. Other pipe interests are willing to buy, but low grade iron is scarce. Numerous sales of foundry were closed, but in no case was the tonnage important. An occasional sale of low phosphorus iron for western shipment is reported. There is no current business in basic, as producers and consumers are still about $1 apart, but any considerable tonnage would probably result in a compromise. There is no local interest in malleable. The West End furnace has gone out of blast and arrangements have been made for rebuilding one of the Brooke furnaces. We quote, prompt delivery, at eastern Pennsylvania plants, as follows:

No. 1X foundry	$16.75 to 17.00
No. 2X foundry	16.00 to 16.50
No. 2 plain	15.50 to 16.00
Standard gray forge	15.00 to 15.25
Basic	15.00 to 15.50
Low phosphorus	19.00 to 20.00
No. 2 Birmingham	15.75 to 16.25
No. 2X Virginia	16.50 to 17.00
No. 2 plain Virginia	16.00 to 16.50

Finished Materials.—The general contract for the Curtis Publishing Co. building has been let to Doyle & Co., but the contract for the steel has not been announced. About 15,000 tons will be required and work will be begun in the early future. No award has been made for the Real Estate Trust addition, but this will be let shortly. The Canton Bridge Co. has secured a 150-ton bridge over the Leipsic river. Cramp & Co. have the contract for a large extension to the assay office in New York city, requiring some 700 tons; Bethlehem sections are specified. Quotations have been received on the steel for Blue's armory at Richmond, 300 tons. The Baltimore & Ohio has placed orders for a large amount of miscellaneous steel supplies, spikes, etc., but it is understood that recent reports of prospective car purchases by this interest were premature. The Jones & Laughlin Steel Co. will supply 2,200 tons of steel bars for the Queen Lane filtration plant. Bids for the 17,000 tons of steel required for track elevation work on the Reading have not gone in and the Bellevue-Stratford addition is still pending.

Throughout the trade, sentiment is much improved and a fair volume of business is being done. We quote: Structural shapes, 1.45c to 1.55c; plates, 1.45c to 1.50c, with the usual extras; sheets, No. 28, 2.80c; steel bars, 1.30c to 1.40c; refined iron bars, 1.35c to 1.45c.

Old Materials.—With the exception of a large tonnage of rails carried for some months, offerings in the railway lists of the month were all disposed of at good prices. Current selling, however, in this district, is still light and is confined to small lots of heavy steel, wrought pipe, turnings and borings. Small lots of steel have sold at from $12 to $13.50, but in the former case the scrap was of inferior quality. We quote, gross tons, eastern Pennsylvania delivery, as follows:

Old steel rails (re-rolling)	$14.50 to 15.00
No. 1 steel scrap	13.50 to 14.00
Old steel axles	17.00 to 17.50
Old iron axles	18.50 to 19.50
Old iron rails	16.50 to 17.00
Old car wheels	14.00 to 14.50
Choice scrap R. R. No. 1 wrought	15.00 to 15.50
No. 1 yard scrap	13.00 to 13.50
Machinery scrap	14.00 to 14.50
Low phosphorus scrap	17.00 to 18.00
Wrought iron pipe	13.00 to 13.50
No. 1 forge fire scrap	11.75 to 12.25
No. 2 forge fire scrap, ordinary	7.00 to 8.00
Wrought turnings	10.50 to 11.00
Axle turnings, heavy	11.00 to 11.50
Cast borings	9.00 to 9.50
Stove plates	11.75 to 12.25

ST. LOUIS.

Fair Sales of Southern Pig Iron—Improvement Expected.

April 19.

Pig Iron.—An aggregate of about 5,000 tons of southern No. 2 pig iron was placed in the St. Louis territory last week at from $11 to $11.50, Birmingham, and about 2,000 tons of northern iron, at about $16.75, St. Louis. Quite a number of inquiries are out for both northern and southern iron, and local dealers expect some of them to be placed before the close of the present week. Dealers do not pretend to assert that a boom has arrived, but confidently expect business to increase at the rate of 25 per cent a week for at least a short time. Some of the furnaces have withdrawn prices for delivery over the third quarter. Our quotations, delivered, to which the freight of $3.75 from Birmingham has been added, follow:

No. 1 southern	$15.75 to 16.25
No. 2 southern	15.25 to 15.75
No. 3 southern	14.75 to 15.25
No. 4 southern	14.25 to 14.75

Coke.—The demand for coke is reported to be strong, with prices about the same as the previous week, with an inclination to become firmer. The best selected Connellsville 72-hour foundry coke is still bringing $2 to $2.25 at the ovens; Connellsville furnace, 48-hour, is held at $1.50 to $1.75, ovens. West Virginia and Virginia prices have not changed. The freight rate to East St. Louis is $2.80, and $2.70 from the Virginia fields when the shipment is destined beyond St. Louis.

Old Material.—Quotations are unchanged as follows:

Cast iron borings, free from foreign material, net tons	$ 5.00 to 5.50
Steel axle turnings, gross tons	10.00 to 11.00
Steel railroad axles, net tons	16.50 to 17.00
Iron railroad axles, net tons	17.50 to 18.50
Miscellaneous steel scrap, gross tons	9.00 to 11.00
Old car wheels, gross tons	14.50
No. 1 railroad cast scrap, net tons	12.00 to 12.50
Heavy machinery cast, net tons	11.50 to 12.50
Stove plate and light cast, net tons	10.00 to 11.00
Sheet iron, net tons, uncut	4.00 to 5.00
No. 1 railroad wrought, net tons	12.00 to 13.00
Railroad malleable, net tons	12.00 to 12.50
Heavy melting steel, net tons	11.00 to 12.00
Relaying rails, net tons	16.00 to 17.50

BUFFALO.

Pig Iron Inquiries More Numerous, but Sales Are Limited.

Office of THE IRON TRADE REVIEW,
932 Ellicott Square, April 20.

Pig Iron.—Inquiries are a trifle more numerous and there continues to be a slight improvement in the tone of the market. Prices, however, can still only be approximated and they vary to meet the demands of the consumer. Buyers are showing more interest in the market than they have for some time, but are not disposed to close business. A large number of the foundries covered sufficient tonnage several months ago to care for their needs for the first half. There have been several inquiries on heavy tonnage the past week from interests apparently desirous of feeling out the market. The foundries are doing a little more business, but are, in most cases, far from running normal capacity.

Several southern furnaces are offering No. 2X foundry in Buffalo at about $12 Rockwood. Some business has, it is understood, been placed within the past few days at this price. We quote the following prices, approximated, f. o. b. Buffalo:

No. 1X foundry	$16.25 to 16.75
No. 2X foundry	15.75 to 16.25
No. 2 plain	15.25 to 15.75
No. 3	15.00 to 15.50
Malleable Bessemer	16.50 to 17.00
Gray forge	14.75 to 15.25
Charcoal	20.50 to 21.00

Finished Products.—Conditions in the finished material market are at this time very uneven, some interests reporting plenty of business and others saying business is slack. For a long time, the specifications have been coming by spurts brought about by the various uncertainties of the market. Predictions on future conditions are not as bountiful as they were, as none feel like indicating what the next few months will bring out in the steel situation. There have been no big lettings lately, but there are several large orders now being figured on which lend some tone to business. The improvements and extensions of the Brooks Locomotive Works at Dunkirk, N. Y., calling for 2,800 tons of fabricated structural, will now proceed, the contract for steel going to the American Bridge Co., of New York. The Pittsburg Bridge & Iron Works will furnish the structural for the building to be erected at Niagara Falls, N. Y., by the Development & Funding Co. This order was for 130 tons.

BIRMINGHAM, ALA.

Pig Iron Prices Hardening—Ensley Plant Still in Operation.

April 19.

While some iron has been selling under $11.50 per ton, even as low as $11 per ton, indications are that there will be a hardening shortly with $11.50 as the minimum. There is an accumulation (only about 60,000 tons) of iron in the southern territory. There is a steady shipment and home consumption holds up well, the cast iron pipe makers in particular being busy.

The announcement that at least 1,000 tons of steel rails would be rolled every day this week at the Ensley steel plant of the Tennessee Coal, Iron & Railroad Co. (United States Steel Corporation), 3,500 tons of the product to be shipped to Mexico via Pensacola, Fla., was most encouraging news given out in the face of reports that there was to be a shut down at the big plant. It is believed there may be orders received shortly that will warrant the statement that no shut down will be found necessary.

Preparations are being made to confirm the sale of the properties of the Southern Steel Co. by the federal court after which the reorganized company will have the opportunity of getting the plants into shape and putting them in operation.

The properties of the Quinn Furnace Co. of Attalla, Ala., will be sold at public outcry May 19, at Gadsden. The properties consist of a little 50-ton-a-day charcoal furnace, charcoal ovens and some adjacent lands. There were no incumbrances.

The following quotations are given on old material in this district:

Old iron rails	$13.50 to 14.00
Old iron axles	13.00 to 14.00
Old steel axles	12.00 to 12.50
Old steel rails	9.00 to 9.50
No. 1 railroad wrought	12.50 to 13.00
No. 2 railroad wrought	10.00 to 10.50
No. 1 country	9.00 to 9.50
Heavy melting steel	8.50 to 9.00
Old steel boiler plate	6.50 to 7.00
No. 1 machinery	10.00 to 10.50
Old standard car wheels	12.00 to 12.50
Tram car wheels	10.50 to 11.00
Stove plate	8.50 to 9.00
Cast iron borings	4.00 to 4.50

NEW YORK.

Good Inquiry for Pig Iron—Structural Business Decreasing.

Office of THE IRON TRADE REVIEW,
Room 1005, No. 90 West St., April 20.

Pig Iron.—The local market has broadened considerably during the past week. Inquiries are coming out in more ample volume, both for prompt shipment and for delivery running through the last half, and a conservative estimate places the business now under negotiation in this district and New England at 30,000 tons. For the most part this inquiry is slow in developing into business, for the reason that consumers who are seeking prompt iron are expecting bargains and those who are in the market for the remainder of the year are endeavoring to cover their requirements on the price level prevailing on current business. A number of furnace interests have purposely established their prices for last half at a prohibitive figure, as they do not wish to take on any important tonnage at or near the present level. The bulk of the inquiry is coming from concerns in upper New York state, and includes foundry, malleable, forge and a little basic. Practically all the pipe manufacturers are willing to take on any lots of iron offered at attractive prices, but the supply of pipe-making irons continues limited both in the north and south. An electrical concern is figuring on 11,000 tons for last half, another inquiry for 7,000 or 8,000 tons is current, and there are several calls for 1,000 and 1,200 ton lots. Several charcoal inquiries are also under consideration and there has been some selling on the basis of $22.50, delivered. One fair sized basic sale is also reported. Prices continue on about the same level, being as follows for early delivery at New York tidewater:

Northern foundry No. 1	$16.50 to 17.00
No. 2X foundry	16.00 to 16.50
No. 2 plain	15.50 to 16.00
No. 2 southern foundry	15.00 to 15.50
Malleable	17.00 to 17.50
Basic	15.50
Gray forge	15.00 to 15.25

Ferro-Alloys.—Inquiries are pending for about 2,500 tons of ferro-manganese, practically all for western shipment, but no selling of importance is

noted. The current price is $40 to $41. Baltimore, on good lots. Considerable ferro-silicon is also under negotiation, and one or two good lots will probably be closed shortly. The price continues at about $70, Pittsburg. A small inquiry for ferro-phosphorus is also current.

Finished Materials.—In the structural field, new propositions which have developed during the past week have been rather small, and it appears that for the most part this will be the experience from now on, as the heavy tonnages required for railroad purposes have largely been covered and the demand from that direction has practically been met for the year. The receivers of Milliken Bros., Inc., during the closing days of the period in which the court allowed them to contract, took several attractive jobs, among them an 1,800-ton building for Dodd, Meade & Co., 1,200 tons for the Rogers, Peet & Co., store in Park Place and a large building for the Peerless Rubber Co. The local assay office addition, which will require 700 tons, will employ Bethlehem sections, and it is probable that they will also be used in the Lorillard warehouse, requiring 3,500 tons of beams. The American Bridge Co. has secured 9,000 tons of bridge work for the New York Central lines, in addition to the 8,000 tons reported a week ago, making 17,000 tons taken by this interest. The balance of the Central tonnage, about the same amount, is expected to go to the Lackawanna Steel Co. and will be fabricated by three or four concerns conveniently located. Other railroad work under negotiation includes 1,500 tons for the Alton and 2,500 tons for the Buffalo, Rochester & Pittsburg, on both of which bids have been received, the balance of the Erie tonnage, about 6,000 tons, and the track elevation requirements of the Philadelphia & Reading. 16,000 or 17,000 tons, on which bids will be received May 17. The Providence train shed is also undecided. Bids have gone in or will shortly on the Mordecai building, Irving Place, 1,200 tons; a 600-ton apartment for the Hall Realty Co. at Broadway and Ninetieth street; a 1,000-ton loft building at Twenty-first street and Broadway; a 750-ton building for Charles T. Wills on Fifth avenue; the East Boston pier shed, 1,100 tons; the State Fair buildings at Syracuse, 500 tons; and the Schenectady court house, which has been cut down to 400 tons. An independent concern has taken a 1,000-ton building at 93d street and Central Park West. An appropriation has been voted for the proposed highway bridge at Portland, Ore., for which several thousand tons of steel will be required. In plain materials the market continues with little change, and we quote:

Angles, 3 to 6 inches x ¼-inch and heavier, 1.46c; beams, 3 to 15 inches, 1.46c; tees, 3 x ¼-inch and heavier, 1.51c; plates, carloads, tanks, 1.46c; marine boilers, 1.86c; bar iron, 1.35c to 1.40c; soft steel bars, 1.31c to 1.36c; sheets, No. 28 black, 2.56c.

Steel Rails.—The Bethlehem Steel Co. is low bidder on 6,000 tons of rails for the Isthmian Canal Commission, tenders on which were opened Monday. The Lackawanna Steel Co. has booked 6,000 tons for the Ann Arbor system, in addition to the 20,000 tons for Cuban shipment. The large Argentine inquiry, heretofore mentioned, is still pending.

Cast Iron Pipe.—The United States Cast Iron Pipe & Foundry Co. secured the Syracuse order, 1,800 tons, but with this exception there have been no important lettings in the east. A very large volume of business is in prospect, New York City alone having immense requirements which will be filled as soon as its finances improve sufficiently. Prices continue very low.

Old Material.—The market is without feature. A limited trade is reported in borings and turnings, wrought scrap and a few other lines, but in no case have important transactions taken place. We quote, gross tons, New York delivery, as follows:

Old steel rails (re-rolling)	$13.50 to 14.50
Relaying rails	19.00 to 19.50
Old car wheels	12.50 to 13.00
Old iron car axles	15.00 to 15.50
Old steel car axles	13.50 to 14.00
Heavy melting steel	10.50 to 11.00
No. 1 railroad wrought	13.50 to 14.00
Iron track scrap	11.50 to 12.00
Wrought pipe	9.00 to 10.00
Cast borings	5.50 to 6.00
Wrought turnings	7.00 to 7.50
Heavy cast scrap	12.50 to 13.00
Railroad malleable	11.00 to 11.50
Stove plate	8.50 to 9.00
Grate bars	8.50 to 9.00

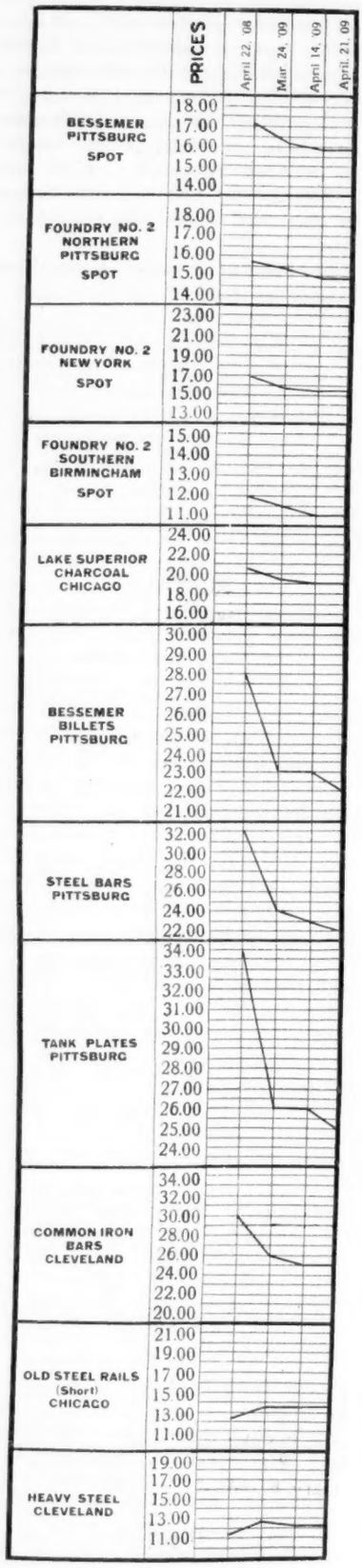
BRITISH IRON MARKET.

Prices of Pig Iron Advancing and Outlook More Hopeful.

Office of THE IRON TRADE REVIEW, Prince's Chambers, Corporation St., Birmingham, Eng., April 10.

The optimistic tone of the iron market noted a week ago has been further emphasized, Cleveland taking the lead in an advance in prices bringing up No. 3 to 47s 9d ($11.68), the highest price for the last two months. Shipments are also improved, reaching for March 91,353 tons, which is 36 per cent more than February, although this is 25 per cent below the same month last year, and 38 per cent below March of 1907. The report would have been still better, but for bad weather. Smelters will benefit slightly

PRICE CHART.



from an improvement in the demand for cast iron pipe. In the South Staffordshire district, the blast furnaces are well off for work and a more cheerful sign is the better call from foundries producing domestic castings of various kinds. The heavy foundries are rather better off, but demand is limited because forges and mills are not sufficiently confident to buy rolls and mill furniture beyond the most urgent requirements. Steel founders are doing rather better, and in this department Messrs. Hadfield's Foundry of Sheffield have booked a big order from the London County Council in respect of the track work for tramway electrification. Generally speaking, the Sheffield forges and mills are better employed. The amount in store at Middlesbrough is 196,339 tons. The additions during the holidays will carry the amount well past 200,000. The hematite department fails to respond as hopefully as the ordinary pig iron market, and the improvement in the steel trade is very slow. West Coast mixed numbers are selling at 57s 6d ($14.08) to 58s ($14.20).

METAL MARKETS.

NEW YORK.

April 20.

Copper.—The market has been fairly active during the past week, with considerable evidence to indicate that more copper is going into consumption all the while. Buying has shown some increase both for domestic and foreign account. Current business is on the following level: Lake, 12⅞c to 13c; electrolytic, 12½c to 12⅝c; casting, 12⅜c to 12½c.

Pig Tin.—Business is still of limited proportions, being confined principally to small lots of spot metal which can be had at 29¼c to 29½c. There is considerable trading among dealers.

Pig Lead.—Some improvement has been made during the week, a fair buying movement having sent prices upward rather sharply. We quote 4.20c to 4.25c, New York.

Spelter.—The market is stronger because of the steady decrease of stocks in smelters' hands. Current trading is on the basis of 5.02½c to 5.07½c, New York.

Antimony.—We quote: Cookson's, 8c to 8⅛c; Hallett's, 7¾c to 8c; ordinary brands, 7½c to 7¾c.

CHICAGO.

April 20.

A week of very fair trading in copper is reported with a prospect that practically higher prices will prevail. A sharp advance in spelter was recorded which, however, is not considered permanent in many quarters. Lead is firm and slightly higher. We quote as follows:

Lake copper, carload lots, 13¼c to 13½c; castings, carload lots, 13c to 13¼c; pig tin, 31c to 31½c; spelter, 5.25c to 5.40c; pig lead, desilverized, 4.20c to 4.30c in 50-ton lots; corroding, 4.75c to 4.80c in 50-ton lots; car lots, 2½c per 100 pounds higher; sheet zinc, 6¾c list f. o. b. LaSalle in car lots of 600-pound flasks; Cookson's antimony, 10½c to 11c; other grades, 10c.

The market for scrap metal continues quiet with no changes in prices.

Copper wire, 11¼c; heavy copper, 11c; light copper, 10¼c; heavy red brass, 10¼c; heavy yellow brass, 8¼c; light brass, 6c; No. 1 red brass borings, 8½c; No. 1 yellow brass borings, 7½c; brass clippings, 8c; tea lead, 3¼c; lead scrap, 3.75c; zinc, 3.25c; tin pipe, 24c; tin foil, 22½c; pewter, 17c; electrotype plates, free from wood, 3.75c; electrotype dross, 2.60c; stereotype plates, 4c; stereotype dross, 3.75c; prime slab zinc dross, $45 per ton.

ST. LOUIS.

April 19.

Lead and Zinc.—A corresponding rise in zinc ore in the Missouri-Kansas-Oklahoma district followed the suddenly increased prices in the St. Louis spelter market last week. The best base price of zinc was $39 a ton for 60 per cent ore. A high price of $41.50 a ton was paid for extra high grade ore. St. Louis spelter was quoted Saturday, a week ago, at $4.67½, and last Saturday it rose to $4.95, an increase of 27½ points. The base price of ore in the district is stronger today by $1 than it has been in many weeks.

Quotations on pig lead in St. Louis increased from $4 to $4.20 within a week, and the price of lead ore in Joplin was as high as $55.50, marking an increase of $1.50 over the quotations of the week before. Calamine sold for $17.50 on a basis of 40 per cent ore. A high price of $19.60 was reported for ore containing high percentage of metallic contents.

WILL BUILD LARGE PLANT.

As stated in our Toronto letter last week, the Standard Sanitary Mfg. Co., Pittsburg, has purchased the jobbing house of the Sommerville Co., Ltd., in Toronto, Can., and will continue the business under the name of the Standard Sanitary Mfg. Co., a Canadian corporation, which will be subsidiary to the American company. Papers of incorporation of the new company have been taken out under Canadian laws. The Standard company has also in contemplation the erection of a large plant in Canada which will be of a size sufficient to meet the demands of the Dominion trade. The location of this plant has not yet been determined, but it will be erected at some point in Ontario.

WILL BUILD TUBE PLANT.

The Haselton Steel Tube Co. has been organized by interests connected with the Republic Iron & Steel Co. for the purpose of erecting a modern tube works at Youngstown, O. The new company will be subsidiary to the Republic Iron & Steel Co. and the plant will be so located that it can draw its iron and steel skelp from the Bessemer works and from the iron mills of the latter at Youngstown. It is planned that the new works will be equipped for manufacturing merchant pipe and large-sized line pipe in both iron and steel. The Republic Iron & Steel Co. is in a favorable position, as respects its manufacturing operations for undertaking the building of a tube works which will provide an important source of consumption for its rolled iron and steel material. The company has been a heavy maker of wrought iron products, some of which it has been furnishing to pipe makers in the form of iron skelp.

CLEVELAND FOR HEADQUARTERS.

After the close of the convention of the National Metal Trades Association in New York last week, a meeting of the administrative council was held, and it was decided to change the national headquarters from Cincinnati to Cleveland. Commissioner Robert Wuest has rented offices in the New England building. An organization of the secretaries of the various branches of the Metal Trades Association has been formed.

ORE TAX BILL IS VETOED.

St. Paul, Minn., April 20.—Governor Johnson today sent to the legislature his veto of the Bjorge tonnage tax bill. This bill, which proposed a tax on all the iron ore of Minnesota, was bitterly fought by residents of the northern part of the state. The governor said there is at present no vital need of a measure of this kind.

THE IRON TRADE REVIEW

Devoted to Iron and Steel Manufacture as to the Machinery, Metal-Working and Foundry Trades

PUBLISHED EVERY THURSDAY BY
THE PENTON PUBLISHING CO.
CLEVELAND.

BOSTON.....73-74 Journal Bldg.
BUFFALO.....932 Ellicott Sq.
CHICAGO.....1328 Monadnock Blk.
CINCINNATI.....First National Bank Bldg.
NEW YORK.....1005 West Street Bldg.
PITTSBURG.....510 Park Bldg.
SEATTLE.....302 Pioneer Bldg.

Subscription, United States and Mexico, $3.00 per annum. To Canada and Foreign Countries, $4.50. Advertising Rates Furnished on Application.

Change of advertising copy must reach this office ten days preceding date of publication.

The Cleveland News Co. will supply THE IRON TRADE REVIEW through the regular channels of the American News Co.

European Agents: The International News Company, Breams Building, Chancery Lane, London, E. C., England.

ENTERED AT THE POST OFFICE AT CLEVELAND AS SECOND CLASS MATTER.

PRINTED IN AN OPEN SHOP.

COPYRIGHT 1909 BY PENTON PUBLISHING CO.

THE AVERAGE PAID CIRCULATION OF THE IRON TRADE REVIEW FOR THE ISSUES OF THE FOLLOWING MONTHS WAS:

January	5,506
February	5,346
March	5,396

April 22, 1909.

THE TOOL STEEL SITUATION.

In our issue of April 15 we printed a communication from E. T. Clarage, a gentleman well qualified to speak on the subject of tool steels. His article is the more remarkable from the fact that the apparent tendency of tool steel manufacturers is to evade discussion of the recently noted strides in the development of high speed tool steels. The situation is certainly most peculiar. We quote further from the article to which our correspondent refers:

When a few weeks ago Prof. Arnold startled an audience by announcing the advent within a year of a tool steel that would do from three to four times as much work as even the best of its predecessors, he told either too much or too little. The wiser course would have been to have said nothing at all, but if Prof. Arnold was unwilling or unable to adopt a course for which every steel maker in Sheffield would have praised him, he should have gone further and laid the whole facts of the case before his hearers. Prof. Arnold no doubt did not grasp, at the moment his disturbing statement was made, that there were stocks of tool steel worth something like one quarter of a million pounds sterling waiting to be sold, and that the premature description of a metal that would render them obsolete would have a very serious effect on Sheffield trade. Neither did he remember that the American and French tariffs were under revision, and that his announcement might jeopardize the successful issue of delicate negotiations then in progress. Had he borne these facts in mind, he no doubt would have decided to leave the matter in the hands of the tool steel makers themselves, who might be trusted to make the announcement at the appropriate time, if, indeed, any announcement were desirable.

It may be easily conceived that a discovery which would greatly reduce the market value of a large stock of steel if not indeed make it entirely worthless, would cause manufacturers to hesitate before giving publicity to radical improvements, but the whole trend of the article is rather towards giving the impression that tool steel manufacturers have long known of the possibilities of tool steel and have been prepared at any time to supply steel of much higher qualities than the best now offered in the market. If this were true, it is a little singular that the information should come from other sources. It is hardly probable that any number of manufacturers should have been in possession of such knowledge. It is a good deal more probable that, as in the past, radical improvements of this nature would be an exclusive possession and the fact that a knowledge of the new developments came about through the publication of the researches of Prof. Arnold, of Sheffield University, and thus became common property, not only caught the steel manufacturers unawares, but immediately precipitated a new series of investigations, practically putting them in the position of beseeching the consumer not to believe that there was anything really new in the published reports, or at least to wait until the existing stocks had been disposed of before demanding the improved steels. Our correspondent is evidently of a different mind and not disposed to withhold from the consumer the opportunity to secure the advantages to be derived from improved steel. Possibly also the machine tool builders, who were forced to entirely revise their designs as the result of the improved steels of a few years since, are afraid that another similar situation may develop and are naturally not anxious to encourage further experiment, at least for the present. It does not appear, however, that the new steels are likely to have such an effect, as the reports seem to show that their improved qualities are rather more in the direction of increased durability than of increased cutting speeds. An unavoidable inference is, too, that with a steel which will make fewer trips to the tool dresser and tool grinder with the consequent waste, will greatly reduce the quantity required, and human nature has not yet arrived at the point where reduced sales will be welcomed in order that the consumer may profit.

BASING POINTS AND COMPETITION.

Predictions have been that the introduction of a second basing point for finished steel products would result in confusion and would rob the market of such of its steadiness as accrued from there being a single system of determining delivered prices, the inference being that a measurable proportion of the steel market's steadiness hitherto had been due to that fact.

Although there would probably be temporary confusion and some localities would suffer during the period of readjustment, such predictions have not given full weight to certain fundamental facts, the chief of which are (1) steel is made from pig iron; (2) multiple basing points have been the rule in pig iron. That steel is made from pig iron is, of course, axiomatic, but some of the conclusions therefrom have been neglected. The conditions which govern the assembling of raw material for the merchant blast furnace apply with equal force to the position of the steel works, if one count out the exceptional cases in which the merchant furnace is positioned only to compete for foundry iron trade. As a rule, the whole history of the pig iron trade has shown a basing point for each important producing district. The practice has not engendered unduly fierce

competition. Statistics could be cited to show that at intervals of not more than half a dozen years pig iron has sold at a certain price, and at double that price, in eastern Pennsylvania, the valleys, Chicago and Birmingham, so that when orders have been good pig iron has advanced very sharply, while on the other hand when orders have been scarce prices dropped and each district stayed in the running. Freight rates cut a large figure when prices are low and a small figure when they are high.

The multiple basing system has been considered the natural thing for pig iron. A suggestion for any other arrangement would be considered ridiculous in the extreme. It should not be held, therefore, that a multiple basing point for finished steel products is contrary to the general principles of trade. The idea of establishing a basing point at Chicago for bars, plates and shapes, for instance, may be regarded as proper on the practical ground that Chicago is a large producing and consuming district, and is destined to become a much larger one. Likewise the making of any city on Lake Erie or in the south a basing point would rest upon the commercial fact that a large center of production and consumption has been established.

In the pig iron trade, the multiple basing point has made for stability rather than otherwise. When orders have been scarce, the opportunities for going just a little outside the nearest territory have been good, and minor incursions could be made, as necessity arose, without creating widespread disturbance. There would simply be sharp competition in some restricted area, as one center or another endeavored to enlarge its trade, going beyond the boundaries of the district naturally tributary to it. With a single basing point, a producer located at a moderate distance from it would see a much larger territory into which incursions could be made; the whole region in the direction opposite to the basing point would be open ground, and competition might be started at one point in it almost as well as at another. With a number of basing points, the intermediate producers could not go far without meeting sharper and sharper competition. In this respect a number of districts, each normally making its own prices, can indulge in a little extra competition now and then with relatively little disturbance.

This fact was illustrated recently in pig iron. Alabama and eastern New York furnaces met in sharp competition in certain sections of New England with the result that prices very attractive to consumers were made, but the pig iron trade of the country at large was not affected. Had the same condition prevailed as to steel products, with a single basing point, the results would have been felt over a large area.

Sentiment in favor of new basing points has been growing in harmony with the agitation for a square deal, because to establish new basing points gives consumers the benefit of the natural advantages of their own localities.

ORE SHIPPING

From Lake Superior Iron Mines Has Been Started.

The shipping of ore from the mines has been started. The Ohio mine, operated by the Buffalo & Susquehanna Co., shipped a cargo to the Marquette docks. In the Crystal Falls district, both the Florence and Dunn mines are shipping regularly and some ore is being sent to Escanaba also from the Hollister and Tobin mines. The Penn Iron Mining Co. group has loaded a small tonnage for shipment. The Oliver Iron Mining Co. has not yet ordered any cars. It is reported that this company expects to ship from the Dober and Mansfield mines during the coming season in the neighborhood of 300,000 tons, as compared with less than 100,000 tons shipped from the mines in 1908. The Calumet mine, operated by Pickands, Mather & Co., will be closed down at once. This is simply a suspension of work for a time for reasons of operating economy. The ore traffic from the Marquette and Menominee ranges will precede shipments from the Minnesota ranges because of the ice blockade at the Soo, which prevents entrance into Lake Superior, but as boats have already departed from lower lake ports for the head of the lakes and some of the boats which wintered at Duluth are prepared for cargoes, an earlier start may be expected this year than last. April 21 has been reported as the date of probable starting for the Pittsburg Steamship Co., which from the reports of ice conditions seems possible, but which may be delayed because of the threatened labor troubles.

Early in the year, the International Harvester Co. investigated its properties near Crystal Falls with a view to further development work. The two properties known as the Victoria and Lot Three are to be worked during this summer, the former having been turned over to M. A. Hanna & Co. and the latter by the Harvester company. The Victoria adjoins the Hill Top property where in the open pit the face of ore extends to the line of the Victoria. The old workings of Lot Three, which have been opened at a depth of 300 feet, have been pumped out and new drifts are being driven. A new lift is also to be sunk at once.

Will Build Furnace.—The E. & G. Brooke Iron Co., Birdsboro, Pa., will build a new blast furnace in place of its No. 3 furnace. Frank C. Roberts & Co., of Philadelphia, have been retained as the engineers.

The stack of the Percy Iron Co., Erie, Pa., will be blown in this week, after being idle since March 15. It will make a short run on malleable and then go on foundry.

The Northwestern Iron Co., Mayville, Wis., started up last week with the Gayley dry blast.

ERRATA.

In the article on "Power Consumption in a Roll Pass," Equation 3, page 759, should read

Equation 3:

$$\frac{N}{\frac{P}{2}} = \frac{\sqrt{P\,(t_1 - t_2)}}{\frac{t_1 - t_2}{2}}$$

$$N = P\sqrt{\frac{R}{t_1 - t_2}}$$

and Equation 5

Equation 5:

$$ab \times \frac{w_1 + w_2}{2} = \sqrt{R\,(t_1 - t_2)}\left(\frac{w_1 + w_2}{2}\right)$$

MEETING OF AMERICAN ELECTRO-CHEMICAL SOCIETY.

The American Electro-Chemical Society will hold its fifteenth general meeting at Niagara Falls, Ont., May 6-8. The sessions will be held in the convention room of the Clifton hotel, headquarters being in the same building. The first session is of particular interest to the iron and steel industry, as it will be a symposium on the electro-metallurgy of iron and steel. This session will begin at 9:30 A. M., May 6, and the program is as follows:

THURSDAY, MAY 6.

"The Heroult Electric Steel Furnace," Robert Turnbull, resident American engineer for Dr. P. L. T. Heroult.

Paul Girod, director "S. A. Electrometallurgique Procedes Girod," Ugine, Savoie, France.

Dr. A. Kjellin, electrometallurgical engineer Metallurgiska Patent Aktiebolag, Stockholm, Sweden.

Cav. Ernesto Stassano, director Fornie Ellectrici Stassano, Turin, Italy.

"Large Electric Steel Furnaces in the Iron and Steel Industry," Remo Catani, electrometallurgist of the "Societe Elba," Portoferraio, Elba, Italy.

"A Contribution to the Study of Electric Furnaces for the Electrothermic Treatment of Iron and Steel," Ch. A. Keller, general manager "Societe des Etablissements Keller-Leleux," Livet, Isere, France.

Gustav Gin, electrometallurgist "Societe Procedes Gin," Paris.

"The Present Value of Electric Steel," Henry D. Hibbard, consulting engineer, Plainfield, N. J.

"The Application of the Lash Process to the Electric Furnace," F. A. FitzGerald, consulting electrometallurgist, FitzGerald & Bennie, Niagara Falls.

"Electric Furnace Pig Iron in California," P. McC. Bennie, consulting metallurgist, Niagara Falls.

"The Electric Furnace Reduction of Iron Ore," Jos. W. Richards, professor of metallurgy, Lehigh University.

"Furnace Electrode Losses," C. A. Hansen.

"The Working Limit in Electrical Furnaces Due to the 'Pinch' Phenomenon," Carl Hering.

At the session on Thursday afternoon there will be three papers on temperature measurements and regulation. The presidential address of E. G. Acheson will be delivered Thursday night on the subject, "The Electro-Chemist and the Conservation of Our National Resources," followed by a smoker.

On Friday there will be held the business meeting of the society, followed by a professional session at which a number of papers on the electrodeposition of metals will be discussed. Saturday morning's session will be devoted to papers on various subjects, including some on calcium alloys, iron alloys, silicon, arc and resistance furnaces and the corrosion of iron.

The excursion features include trips to the plants of the various Canadian power companies on Friday afternoon, and to the plants of the American power companies and of the International Acheson Graphite Co., on Saturday afternoon. On Saturday evening, the society will be entertained by the Niagara club.

MACHINERY MANUFACTURERS WILL ENTERTAIN.

Pittsburg machinery manufacturers and jobbers are making extensive preparations for the entertainment of the many visitors that are expected to be present at the joint meeting of the National Supply and Machinery Dealers' Association and the American Supply and Machinery Manufacturers' Association, to be held May 12, 13 and 14 at the Fort Pitt hotel in that city. The extending of the city's hospitality during the convention is in the hands of a general committee composed of prominent manufacturers and machinery and supply jobbers of the immediate Pittsburg district. W. L. Rogers, president of the Pittsburg Gage & Supply Co., is chairman of the general committee, W. T. Todd, of Somers, Fitler & Todd Co., treasurer, and Geo. D. McIlvaine, secretary. The chairmen of the various sub-committees are as follows: Finance, W. T. Todd; entertainment, O. P. Meckel; banquet, W. E. Frick; publicity, Geo. D. McIlvaine.

Some of the entertainment features have already been settled upon. On Wednesday night, reservations have been made for 600 guests at a vaudeville performance to be given at the Grand opera house, which will be followed by a smoker at the Fort Pitt hotel. The convention banquet will be held Thursday evening at the Fort Pitt hotel and H. B. Lupton, vice president of the Oliver Iron & Steel Co., Pittsburg, will serve as toastmaster. The principal speakers who have already accepted will be United States Senator Geo. T. Oliver, of Pennsylvania and Private John Allen, of Mississippi. An invitation has also been extended to Dr. Alderman, president of the University of Virginia.

Special entertainment will be provided for the visiting ladies. The program includes a sight-seeing street car trip over the Pittsburg street railway system Wednesday afternoon, the vaudeville show Wednesday night and an auto tour of the residential section Thursday afternoon followed by a luncheon at the Pittsburg Country Club.

No Bid.—The properties of the Passaic Steel Co. were offered for sale at the offices of the company, Paterson, N. J., Friday, April 16. An upset price of $700,000 had been fixed by the court, and there was no bid of this amount offered. The property will be readvertised.

The Muirkirk charcoal furnace of Coffin & McCauley, at Muirkirk, Md., will be blown in June 1.

WASHINGTON MEETING OF THE A. S. M. E.

The regular spring meeting of the American Society of Mechanical Engineers will be held in Washington, May 4-7. The headquarters will be at the New Willard hotel. The program provides for three professional sessions, and three addresses; numerous entertainments are provided, including a reception by President Taft, an exhibition drill by the troops at Fort Myer, visits to the navy yard, the museums, the city pumping station, city electric lighting plant, a trip by boat to Mount Vernon, and others. The program in detail follows:

TUESDAY, MAY 4.

OPENING SESSION, 8:15 P. M.

Reception at the New Willard Hotel. Music by the Marine Band.

Address of Welcome by Hon. Henry B. F. Macfarland, president of the board of district commissioners.

Response by Jesse M. Smith, president of the society.

WEDNESDAY, MAY 5.

PROFESSIONAL SESSION, 9:15 A. M.

Business meeting. Reports of committees, tellers of election, new business.

PAPERS.

"A Unique Belt Conveyor," Ellis C. Soper.

"Automatic Feeders for Handling Material in Bulk," C. Kemble Baldwin.

"A New Transmission Dynamometer," Prof. Wm. H. Kenerson.

"Polishing Metals for Examination With the Microscope," Albert Kingsbury.

WEDNESDAY AFTERNOON.

Special exhibition drill by troops at Fort Myer, 2:30 P. M.

Trips to nearby points of interest.

WEDNESDAY, 8:15 P. M.

Illustrated lecture by F. H. Newell, director of the Reclamation Service, on "Home-Making in the Arid Regions."

THURSDAY, MAY 6.

THE GAS POWER SECTION, 9:15 A. M.

"Marine Producer Gas Power," C. L. Straub.

"An Operating System for a Small Producer Gas Power Plant," C. W. Obert.

"A Method of Improving the Efficiency of Gas Engines," Thos. E. Butterfield.

"Offsetting Cylinders in Single-Acting Engines," Prof. T. M. Phetteplace.

THURSDAY, 2:30 P. M.

Reception of members and guests by President Taft in the East Room of the White House.

THURSDAY, 8:15 P. M.

Address, "The Engineer in the Navy," by Rear-Admiral Geo. W. Melville, retired.

Address, "Rear-Admiral Melville's Service to the Engineering Profession and to the Nation," and presentation to the national gallery of a portrait of Rear-Admiral Melville; by Walter M. McFarland, of Pittsburg, Pa. Acceptance of the portrait by Dr. C. D. Walcott, representing the nation.

FRIDAY, MAY 7.

PROFESSIONAL SESSION, 9:15 A. M.

"Small Steam Turbines," Geo. A. Orrok.

"Oil Well Tests," Edmund M. Ivens.

"Safety Valve Discussion," continued from the February meeting in New York.

"Specific Volume of Saturated Steam," Prof. C. H. Peabody.

"Some Properties of Steam," Prof. R. C. H. Heck.

"A New Departure in Flexible Staybolts," H. V. Wille.

FRIDAY AFTERNOON.

Trip by boat to Mount Vernon.

No. 3 stack of the Shenango Furnace Co., at Sharpsville, Pa., was blown in April 12, after being enlarged and considerably modified.

CLOSE SCRUTINY

BEING GIVEN STRUCTURAL CLAUSE OF TARIFF BILL.

Steel Interests Pleased by Senate Amendments — Comparison of Rates With Dingley Bill— Estimate of Revenues.

Washington, D. C., April 20.—The important developments during the week in the tariff revision program had the effect to clarify the atmosphere to some extent, especially with respect to the question of revenues, but a number of points affecting the metal schedule, and the general issue of duties or no duties upon materials, as well as the drawback question, and the sections of the bill relating to maximum and minimum rates of duty, remain to be considered in detail when the administrative sections of the bill are reported to the senate.

The complicated details of the changes made by the finance committee of the senate in those provisions of the Payne bill which relate to metals of different forms are receiving the careful attention of the representatives and senators from the iron and steel producing sections of the country. For the most part the proposed changes are approved, and it is believed that with the additions to be made to the bill, in the direction of remitted duties under the drawback section on imported materials entering manufactured commodities for the export trade, the advantages to accrue to domestic manufacturers from the new law will more than compensate for the reduced duties in some lines.

Structural Steel.

Such attention as has been given to the complex features of the finance committee changes brings out the information from senators who have given close attention to the metal schedule that the changes with respect to structural steel, for example, will probably be found not to be worthy of the animadversions which some of the metal trades journals have given to them. In the matter of the addition to the item covering imports of structural steel, it is asserted, as a result of the inspection given to the matter by members of the finance committee and senators who are in position to know, that the change is not to be regarded as a "joker" which would so reduce duties on structural steel as to work hardship to eastern manufacturers. The point is made that the general effect of the changes, apart from the addition of the words of qualifying character, "but not assembled, manufactured, or advanced beyond hammering, rolling or casting," would have the effect to transfer those items to a higher rate than that imposed in the schedule covering structural steel. The existing *ad valorem* rate of the tariff on these items is figured by the committee experts to be about 36 per cent. The rate imposed by the senate committee bill is intended to give an average *ad valorem* rate of about 29 per cent. In the case of structural steel advanced in manufacture by punching, etc., as it appears from the study that has been given to the subject by the experts, the effect would be to advance the rates on such finished or assembled manufactured structural steel to an average *ad valorem* import rate of 45 per cent, or 16 per cent higher than the general rate imposed on structural steel when not assembled, manufactured or advanced beyond hammering, rolling or casting.

Heavy Ad Valorem Rate.

The claim is made that while structural steel is usually imported on contract, assembled and ready for application to contract designs for completed work, the probability is that under the terms of the senate committee change in this item, the structural steel imported under the proposed bill, if it shall become a law in the form recommended by the committee, would be punched or advanced to completed manufactured stage after it arrives in this country. The subject is being examined into with care by the committee experts, and representatives of the iron and steel producing states, and it will be perfected if it is found that hardship may result from the arrangement of the schedules by the senate committee. Some time will be spent in consideration of the items of the dutiable and free list, before the administrative features of the bill are taken up. During the consideration of the first parts of the bill, opportunity will be presented for close attention to the minor, as well as the important, items.

Probable Revenues.

The most significant feature of the statement accompanying the opening up of the tariff bill discussion in the senate was Chairman Aldrich's detailed review of the revenue possibilities of the measure, and his announced determination to favor a policy of retrenchment in government expenditures in order to insure that the revenues expected to be derived from the new tariff law will meet the requirements of the government. According to the estimate made by the chairman, it will require a saving of $35,000,000, in addition to the increased revenues to be derived from the proposed law, to meet the requirements. It should also be borne in mind that the estimate of probable revenues under the bill has been shifted from the house committee basis, the year 1906, to 1907. The senate committee accepted the fiscal year ending 1907, instead of the previous year, for the manifest reason that, while the Dingley rates were in force in both years, the financial disturbance did not set in until the latter part of 1907, and it was agreed that it would be fairer to take the later year as a basis for the estimates. By this shift the senate committee obtained the advantage of about $40,000,000 in revenues represented by the increase in customs receipts during the fiscal year ending June 30, 1907, compared with the previous fiscal year. At the same time, due allowance must be made for the fact that the senate committee report is based upon importations during the coming year of like quantities and qualities of goods as came in during the 1907 period, upon which the estimates are made. While there already are indications of increasing importations, it is at least problematical whether the total importations during the next year or two will reach the aggregate of the year 1907.

Effect of Revision.

The fact should not be overlooked, at the same time, that the question of the general advance in the average *ad valorem* rates of duties under the proposed bill, compared with the existing Dingley law rates, may bring sharp criticism from those people in the country who have been demanding lower duties, and who have expected that a revision of the tariff meant a revision downward.

According to the estimate made by the senate committee, upon its bill as reported, there will be an advance in the general *ad valorem* rates of duty from 44 per cent, the general average of the Dingley law for 1907, to about 46 per cent, if the bill shall go through according to the schedules of rates fixed by the senate committee. This is an advance of about 1 per cent over the general average of the Payne bill rates as that measure passed the house.

It is well to note the fact that while the general average *ad valorem* rate of the senate bill is reduced, as respects the metal schedule, about 1 per cent, and a reduction is made of the general average of the schedule relating to lumber and other woods of about 4 per cent; other schedules, notably fine wines, silks, and sundries, show an upward tendency in rates, which will bring the average *ad valorem* rate of the new measure to the 2 per cent advance indicated by the committee in its estimate of the final results, based upon its reported bill.

ARTHUR J. DODGE.

NILES-BEMENT-POND STATEMENT.

The following statement of its condition on Dec. 31, 1908, has been made to the secretary of the commonwealth of Massachusetts by the Niles-Bement-Pond Co.:

ASSETS.

	1908.	1907.
Real estate, etc.	$ 3,708,507	$ 3,651,152
Merchandise	1,692,552	1,614,767
Cash and debts receivable	2,494,052	3,556,223
Investments	5,403,447	5,398,740
Advance ins. and taxes.	12,526	13,779
Plant additions in process	.....	45,895
New York office	.....	3,544
Total	$13,311,084	$14,284,102

LIABILITIES.

Capital stock	$10,500,000	$10,500,000
Accounts payable	366,195	785,192
Divs. decl., pfd., Feb. 15, 1908	.....	30,000
Divs. decl., com., Mar. 20, 1908	.....	127,500
Divs. decl., com., June 30, 1908	.....	127,500
Profit sharing funds	.....	57,837
Surplus	2,444,889	2,656,073
Total	$13,311,084	$14,284,102

PERSONAL.

Mr. F. C. Mosedale, resident agent at Buffalo for M. A. Hanna & Co., has recovered from a severe attack of pneumonia.

Thomas D. West, who recently severed his connection with the Thomas D. West Foundry Co., of Sharpsville, Pa., will take up his residence in his former home in Cleveland. He will be identified with the West Steel & Iron Casting Co., of Cleveland, of which his son is president. On the eve of his departure from Sharpsville, Mr. West was presented a loving cup by his former employes, and a few evenings afterward a farewell testimonial was tendered him by his friends and fellow citizens of Sharpsville, in which they all expressed much regret at his leaving their city.

OBITUARY.

George Nissen, for many years active on the New York Metal Exchange, of which he was a member of the board of managers, died April 15. For some time he had been associated with the Pope Metals Co.

A. M. Gilbert, former president of the Buda Foundry & Mfg. Co., of Chicago, died April 13 at Santa Barbara, Cal., where he had removed two years ago to benefit his health. At one time he was manager of the Fairbanks-Morse Co., and later he was with the Crane Co.

A. M. Gilbert, formerly president of the Buda Foundry & Mfg. Co., Chicago, who had been for the past two years in California because of his health, died April 13 at Santa Barbara. Mr. Gilbert was a pioneer business man of Chicago. He was formerly connected with Crane Co. and was at one time manager of Fairbanks, Morse & Co. Mr. Gilbert died of heart trouble.

R. D. Carver, assistant general sales manager of the Pittsburg Steel Co. in charge of the Chicago office, died April 11 of pneumonia. Mr. Carver was about 47 years old. He was prior to the formation of the American Steel & Wire Co. connected with the Cincinnati Barb Wire Co., and with the taking over of that company he entered the employ of the American Steel & Wire Co. He later became secretary of the Southern Steel Co., which concern he left at the time of its reorganization to accept the position he held at the time of his death.

Longley Lewis Sagendorph, well known as a manufacturer of sheet metal, died April 13 at his home in Philadelphia, aged 67. He established the Sagendorph Corrugated Co. in Cincinnati in 1869, but removed to Philadelphia in 1885. At the time of his death he was connected with a number of manufacturing concerns, being president of the American Metal Stamping Co., the Penn Metal Ceiling & Roofing Co., and the New York Iron Roofing & Corrugating Co. He was a member of the Manufacturers' Club of Philadelphia and many other organizations.

Job Froggett, who for 36 years was identified with the various corporations conducting the Brown-Bonnell Iron Works at Youngstown, O., died at his home there April 18. For over a quarter of a century, he was blast furnace manager of the Brown-Bonnell plant, including the Phoenix and Falcon stacks, now dismantled, and the Struthers, O., furnace while owned by the Brown-Bonnell Co. He also managed the Hannah stack when owned by the Mahoning Valley Iron Co., and was the last manager of the Himrod stacks, just prior to their being dismantled. For something like a year following his retirement from the Brown-Bonnell Co., in 1885, he blew a blast furnace at East St. Louis, with which Youngstown, O., capital was identified. Of later years, he had been retired from active participation in iron manufacture. He was born Oct. 12, 1829, at Southfield, Orange county, N. Y., where his father was then employed at a charcoal blast furnace which was finally dismantled a few years ago. He first established his residence at Youngstown in 1848. His son, Joseph F. Froggett, is an associate editor of THE IRON TRADE REVIEW.

CENTRAL TUBE CO.

Purchases Property of Pittsburg Steel Construction Co.—Extensive Plans.

The Central Tube Co. with principal offices in the Lewis building, Pittsburg, and capitalized at $350,000, has been chartered under the laws of the state of Pennsylvania. The company has been organized by interests hitherto identified with the Pittsburg Steel Construction Co., and has purchased the grounds and buildings of the latter located at Economy, Pa., and covering about 14 acres of land, completely equipped with railroad tracks, power plant and mill buildings. It is the intention of the tube company to install in these buildings as soon as possible a completely equipped butt-weld pipe mill for making black and galvanized merchant pipe from ¼-inch to 3 inches diameter.

The pipe mill, threading floor and socket department will be located in the group of buildings 120 feet wide x 460 feet long which were formerly used as laying out and assembling shops. Connected at one end of these buildings is a structure which had previously served as a riveting shop, and this will be used as a warehouse for the new pipe mill. This building is 75 feet wide x 200 feet long and is entered by two railroad tracks, providing excellent shipping facilities.

All the buildings are admirably adapted to house a strictly modern pipe mill, as they are well lighted and are equipped throughout with electric traveling cranes. The structural machinery with which the plant was formerly equipped has been sold and removed from the buildings, and the work of installing the new pipe mill is now progressing favorably, so that it is expected that the plant will be ready for operation about July 1.

At a later time, it is planned to add butt-weld mills, lap-weld mills, enameling plant, etc., as ample ground is available. The officers of the Central Tube Co. are: President, Alex. Laughlin; vice president, C. W. Coffman; secretary and treasurer, G. C. Pease.

The Pittsburg Steel Construction Co. which for several years past has been an active factor in the fabrication of mill buildings, bridges, etc., is announcing to the trade its intention to cease bidding on work. The company has sold its plant, tools, stock of structural material, etc., and expects to retire completely from the structural business upon the completion of certain contracts that it now has on hand.

AMONG MACHINERY MAKERS.

MILWAUKEE.

Decision of Interest to Shippers of Machinery—Plant Additions.

Milwaukee, Wis., April 19.—Milwaukee machinery manufacturers have been interested in the fact that the interstate commerce commission has decided in favor of Lindsay Bros., of Milwaukee, manufacturers of agricultural implements, in the case brought against the Baltimore & Ohio Southwestern Railroad Co. and others in regard to the excessive rates charged by the defendants. It was held that the defendants' joint through rate of 29 cents per 100 pounds on a shipment of vehicles from Lawrenceburg, Ill., to Milwaukee, was unreasonable at the time of shipment. The commission also held that the rate should not have exceeded the combination of local rates of 25 cents per 100 pounds, which is found reasonable for the future between the points in question. Reparation was awarded on that basis. Machinery men say that the fact is all important that the commission again insisted on the principle that, in the absence of justifying legislation, a through rate in excess of the sum of the locals is an unreasonable rate at all times.

Several Wisconsin and Milwaukee manufacturers have been successful bidders in the contracts which have been awarded for material and supplies for the Panama canal of late, among them: The Northwestern Malleable Iron Works, H. W. Johns-Manville Co., George H. Smith Steel Casting Co., Power & Mining Machinery Co., the Bucyrus Co., Milwaukee; Northern Electric Mfg. Co., Madison; Rock River Machine Co., Janesville; Fairbanks-Morse Co., Beloit, and the Sullivan Metallic Packing Co., Baraboo. Contracts aggregating $300,000 were awarded in Milwaukee alone.

The West Allis Malleable Iron & Chain Belt Co., of West Allis, Wis., Milwaukee suburb, has just completed its new two-story brick building, 54 x 130 feet, at a cost of $9,000. Facilities of the plant are much larger and it is expected that the general output will be increased.

The Milwaukee Stamping Co., located at West Allis, Wis., has completed doubling the size of its plant by the erection of a new addition, 60 x 350 feet. August Petrie, president of the company, which manufactures a large percentage of the satchel and trunk trimmings used in the country, announces that another new plant to be erected during the latter part of the year is now being contemplated.

The Wisconsin Wire-Bound Box Co. has been incorporated at Milwaukee to manufacture a patented shipping box bound with wire to prevent tampering with contents in transit.

E. P. Worden, chief engineer of the Fred M. Prescott Steam Pump Co., of West Allis, gave an illustrated lecture on "Modern Mine Pumping" at the recent monthly meeting of the Milwaukee Engineers' Society, of which he is president.

The Milwaukee Bridge Co. has been awarded the contract for doing the iron work on the new $30,000 vat house which will be erected by the United States Glue Co. at Carrollviile, Wis.

The Milwaukee Steel Post Co., Fourth and Poplar streets, Milwaukee, has leased the building at 245 Lake street, a location which will double the company's present quarters.

The Wisconsin Bridge & Iron Co., of Milwaukee, has been awarded a contract for the erection of a bridge across the waterpower canal of the Green Bay & Mississippi Canal Co. at Kaukauna, Wis., at $1,947.

The Filer & Stowell Co., of Milwaukee, has received the contract for installing a "1900" heavy duty Corliss engine of the rolling mill type in the plant of the Moore & Galloway Lumber Co. at Fond du Lac, Wis. The engine is of between 700 and 800 horsepower and weighs 70,000 pounds.

Edward Brill, of Appleton, Wis., is receiving some substantial orders for the construction of gasoline engines of the marine type. Mr. Brill is turning out four sizes of marine engines, besides stationary engines and those for automobile use.

CINCINNATI.

Orders for Small Tools More Numerous Than for Heavier Types.

Office of THE IRON TRADE REVIEW,
First National Bank Bldg., April 20.

There is no defined tone to the market. Business is coming in irregularly and some shops are doing fairly well, while others are complaining of light orders. Some shops have accumulated stock to an extent which has made it seem advisable to close down for a time. Makers of small tools are in the general sense doing better than the producers of the heavier types. Builders of special machinery are fairly well supplied with work. Engine builders of the heavy types are reporting orders scarce. The whole situation continues in that condition of waiting for a return to stable and regular business which allows manufacturers to proceed with some degree of certainty. There is enough inquiry and correspondence to give encouragement as to the future, but for the present it seems to be difficult to find enough orders to go round and keep all the shops in operation.

The hope that the tariff question may come to an early adjustment prevails, as there is belief that, with that matter out of the way, an improvement may be expected.

The Cincinnati Pulley Machinery Co. has been fortunate in receiving a satisfactory run of orders which has kept the shop busy for several weeks on full time.

The Oesterlein Machine Co. notes an improved tone to the situation and is looking forward to continued gain in volume of orders.

The Hisey-Wolf Machine Co. has been one of the busy shops and has been getting a good steady run of orders recently.

Business is holding well with the Cincinnati Milling Machine Co. and the company is behind on deliveries on some sizes.

George K. Elliott, chief chemist and metallurgist of the Lunkenheimer Co., will address a body of engineers of Chicago this week on the subject of the "Application of Metallurgy to Steam Engineering."

PITTSBURG.

Improvement in Orders for Mill Equipment—Some Large Projects.

Office of THE IRON TRADE REVIEW,
510 Park Bldg., April 20.

Considerable improvement in mill equipment has been noted in the machinery market during the past 10 days and there are a number of good-sized projects now undergoing estimates which are giving the manufacturers a better outlook for business. The crane market has displayed quite a degree of activity and a number of contracts have recently been closed for new plants and extensions, some of the steel companies having been purchasers.

In mill machinery lines, bids are being taken on several large undertakings, including an independent tin

mill to be erected at Holliday's Cove, W. Va., and for additional pipe furnaces of the Youngstown Sheet & Tube Co., at Youngstown, O. Rolling machinery makers are also very much interested in the announcement of the intention of the Republic Iron & Steel Co. to build tube mills at Youngstown, O.

The roll manufacturers have been enjoying a better trade, which is going largely to replacements. One very large inquiry for tin mill rolls is now in the market.

The coming of warm spring weather has stimulated interest in refrigerating machinery and a good run of orders is being taken. Some manufacturers are well sold up and are not promising deliveries under 45 days. Valve and piping equipment plants are suffering for a want of work owing to the limited new plant construction that has been inaugurated during the past year.

The N. C. Davison Co., Keenan building, Pittsburg, is enjoying a good demand for refrigerating machinery. Among the recent orders taken was an 18-ton Larson-Baker plant to be driven by a 35-horsepower engine for J. D. Biggin & Sons, Sharon, Pa.; a six-ton machine to be driven by a 16-horsepower engine for the Uniontown Hotel Co., Uniontown, Pa., and four-ton machines each to be driven by 6-horsepower engines for Baker & Smith, Titusville, Pa., and W. H. Doll, Bellefonte, Pa.

The Crane-Best Co. is still considering bids on an electrical power plant of 3,000 horsepower capacity in two units which will be installed at its new works at Oakmont, Pa. Eventually the company plans to have a power plant of at least 10,000 horsepower capacity.

The East Penn Electric Light, Heat & Power Co., with a capital of $10.000, has been incorporated by Josiah H. Fisher, H. L. Hinterliter, Topton, Pa.; Frederick Perry, Geo. F. Souwers, Germantown, Pa., and M. H. Bochow, of Philadelphia.

The Reading Iron Co., Reading, Pa., has been buying some equipment in connection with extensive improvements being made to its plant.

The Cambria Steel Co. and the Pennsylvania Steel Co. have been recent inquirers in the crane market and have made some purchases, the former having just closed for an assortment of six machines for delivery at Johnstown, Pa.

The Central Tube Co., Pittsburg, which will occupy the old buildings of the Pittsburg Steel Construction Co. at Economy, Pa., has awarded contracts for the tube mill equipment which will be installed in the plant for the manufacture of small black and galvanized pipe.

The independent tin plate interests, which are projecting a new mill to be erected at Holliday's Cove, Hancock county, W. Va., are still taking figures on the rolling equipment planned, consisting of eight hot and 12 cold mills. Parties connected with the Phillips Sheet & Tin Plate Co., Clarksburg, W. Va., are understood to be interested in the organization of the new company.

NATIONAL ELECTROPLATERS' ASSOCIATION.

The National Electroplaters' Association organized for the purpose of advancing and disseminating knowledge concerning the art of electrodeposition of metals, including the finishing of metals generally, has been organized with Chas. H. Proctor, Arlington, N. J., president; Nathan E. Emery, treasurer, and B. W. Gilchrist, box 26, Woodhaven, L. I., secretary. A bureau of information and a laboratory equipped for research work will be maintained by this body, and meetings will be held for the purpose of presenting and discussing papers upon appropriate subjects relating to this trade. The active membership includes supervisors, general foremen and foremen of electroplating and finishing plants.

To Handle Foreign Ores.—Possibly the largest ore handling plant on the Atlantic coast will have been constructed when improvements and extensions are completed by the Philadelphia & Reading railroad on pier No. 4, at Port Richmond, Pa., near Philadelphia. The present pier will be widened 45 feet and lengthened to a total of 764 feet, concrete being employed. Dredging to accommodate the largest vessels entering the port will be done. Gantry cranes will be installed to span four tracks, each with a maximum capacity of 300 tons of ore an hour. It is at this pier that ore is received from Cuba and Newfoundland and thence distributed to blast furnaces throughout eastern Pennsylvania.

The Pittsburg Chamber of Commerce has just published statistics showing that the freight tonnage of Pittsburg for 1907 exceeds the combined tonnage of New York, London and Liverpool, being 161,194,167 tons, exclusive of freight in transit.

PREVENTION OF SMOKE

Declared Possible and Economical by Government Investigators.

The United States geological survey, technologic branch, announces that a bulletin on smokeless combustion of coal in boiler plants will soon be issued, which gives in detail a study of conditions found in industrial establishments in 13 of the principal cities of New York, Pennsylvania, Maryland and the central west, and covering between 400 and 500 plants which have been inspected. The results of these investigations which have been prepared by Messrs. B. T. Randall and H. W. Weeks, show that bituminous coals, high in volatile matter, can be successfully burned without smoke, even in large plants carrying widely fluctuating loads, where boilers with banked fires must be put into service quickly and forced to their capacity. Attention is given to various designs of stokers and furnaces and to the conditions under which they must be operated to attain these results.

The burning of coal without smoke is a problem which concerns the government directly because of the advantages of smokeless combustion both in public buildings and on naval vessels. In addition, smoke abatement is a factor in conserving the fuel resources of the United States, hence, as a part of its general investigation of the best methods of utilizing the coals of this country, the United States geological survey has made extended tests to determine the conditions necessary for the smokeless combustion of bituminous coal in boiler plants.

General Conclusions.

General conclusions of Messrs. Randall and Weeks, based upon the investigations referred to, and upon extensive experiments carried out at the government fuel testing plants at St. Louis and Norfolk, are briefly summarized as follows:

Smoke prevention is possible. There are many types of furnaces and stokers that are operated smokelessly.

Stokers or furnaces must be set so that combustion will be complete before the gases strike the heating surface of the boiler. When partly burned gases at a temperature of, say 2,500 degrees Fahr., strike the tubes of a boiler at, say 350 degrees Fahr., combustion is necessarily hindered and may be entirely arrested. The length of time required for the gases to pass from the coal to the

heating surface probably averages considerably less than one second, a fact which shows that the gases and air must be intimately mixed when large volumes of gas are distilled, as at times of hand firing, or the gas must be distilled uniformly, as in a mechanical stoker. By adding mixing structures to a mechanical stoker equipment both the amount of air required for combustion and the distance from the grates to the heating surface may be reduced for the same capacity developed. The necessary air supply can also be reduced by increasing the rate of combustion.

No one type of stoker is equally valuable for burning all kinds of coal. The plant which has an equipment properly designed to burn the cheapest coal available will evaporate water at the least cost.

A well-designed and well-operated furnace will burn many coals without smoke up to a certain number of pounds per hour, the rate varying with different coals, depending on their chemical composition. If more than this amount is burned, the efficiency will decrease and smoke will be made, owing to the lack of furnace capacity to supply air and mix gases.

High volatile matter in the coal gives low efficiency and vice versa. The highest efficiency was obtained when the furnace was run at low capacity. When the furnace was forced the efficiency decreased.

With a hand-fired furnace the best results were obtained when firing was done most frequently, with the smallest charge.

Peat, lignite and sub-bituminous coal burned readily in the type of tile-roofed furnace used and developed the rated capacity with practically no smoke.

Coals which smoked badly gave efficiencies 3 to 5 per cent lower than the coals burning with little smoke.

Briquettes were found to be an excellent form for using slack coal in a hand-fired plant. They can be burned at a fairly rapid rate of combustion with good efficiency and with practically no smoke. High-volatile coals are perhaps as valuable when briquetted as low-volatile coals.

Comparison of Tests.

A comparison of tests on the same coal washed and unwashed, showed that under the same conditions the washed coal burned much more rapidly than the raw coal, thus developing high rated capacities. In the average hand-fired furnace washed coal burns with lower efficiency and makes more smoke than raw coal. Moreover, washed coal offers a means of running at high capacity, with good efficiency, in a well-designed furnace.

Forced draft did not burn coal any more efficiently than natural draft. It supplied enough air for high rates for combustion, but as the capacity of the boiler increased the efficiency decreased and the percentage of black smoke increased.

Most coals that do not clinker excessively can be burned with 1 to 5 per cent greater efficiency and with a smaller percentage of black smoke on a rocking grate than on a flat grate.

Air admitted freely at firing and for a short period thereafter increases efficiency and reduces smoke.

As the CO in the fuel increases the black smoke increases; the percentage of CO in the flue gas is therefore, in general, a good guide to efficient operation. However, owing to the difficulty of determining this factor, combustion cannot be regulated by it.

The simplest guide to good operation is pounds of coal burned per square foot of grate surface per hour.

None of the problems of combustion has received more experimental treatment than the burning of coal in hand-fired furnaces. Hundreds of devices for smokeless combustion have been patented but almost without exception they have proved failures. This record may be explained by the fact that many of the patentees have been unfamiliar with all the difficulties to be overcome, or have begun at the wrong end. Numerous patents cover such processes as causing the waste gases to re-enter the furnace, and schemes for collecting and burning the soot are legion. So many manufacturers who have been looking for some cheap addition to a poorly constructed furnace to make it smokeless have experienced inevitable failure that the work of educating the public to rid cities of the smoke nuisance has been hard, long and only partly successful.

The total number of steam plants having boilers fired by hand is far greater than the total of plants with mechanical stokers, but if the comparison is based on total horsepower developed the figures show less difference. Particularly is this true in sections of the central west, where mechanical stokers are generally used at large plants. As a general rule, hand-fired plants do not have proper furnaces, and methods of operation are far from conducive to good combustion. Coal is usually fired in large quantities, and little opportunity is given for the air and gases to mix before the heating surface is reached and combustion is arrested. In all the hand-fired plants visited success in smoke prevention has been obtained chiefly by careful firing. The coal was thrown on often in small quantities; the fire was kept clean, enough ash to prevent the passage of air through the fire never being allowed to collect on the grate; and more air was supplied at firing than after the volatile matter had been distilled. Even with such precautions the plants might have made objectionable smoke at times but for the fact that usually some method was employed for mixing the gases and air before they reached the heating surface.

Deductions From Facts.

Some general conclusions from the facts set forth in the bulletin are as follows:

The flame and the distilled gases should not be allowed to come into contact with the boiler surfaces until combustion is complete.

Fire brick furnaces of sufficient length and a continuous or nearly continuous supply of coal and air to the fire make it possible to burn most coals efficiently and without smoke.

Coals containing a large percentage of tar and heavy hydro-carbons are difficult to burn without smoke and require special furnaces and more than ordinary care in firing.

Briquettes are suitable for use under power-plant conditions when burned in a reasonably good furnace at the temperatures at which such furnaces are usually operated. In such furnaces briquettes generally give better results than the same coal burned raw.

In ordinary boiler furnaces only coals high in fixed carbon can be burned without smoke, except by expert firemen using more than ordinary care in firing.

Combinations of boiler-room equipment suitable for nearly all power plant conditions can be selected, and can be operated without objectionable smoke when reasonable care is exercised.

Of the existing plants some can be remodeled to advantage. Others can not, but must continue to burn coals high in fixed carbon or to burn other coals with inefficient results, accompanied by more or less annoyance from smoke. In these cases a new, well-designed plant is the only solution of the difficulty.

THE BETTERMENT OF EMPLOYES

WAS LEADING TOPIC OF METAL TRADES CONVENTION.

National Association Has Stood the Test of Dull Times—Plan for Aiding Winona School Agreed Upon—Closer Relations With National Founders' Association Discussed.

We have acquired the reputation of being not only a powerful organization, but also for being just. It now remains for the members to foster such methods as will make for the betterment of their employes and their dependents, as for instance employers' liability insurance, provisions for employes grown old in service, improved methods of industrial education, and sane and wholesome local, state and national legislation. If they will do these things as they should be done, and as only an organization which is national in its scope can do them, then I know that the association's future will be assured.

This statement by Commissioner Robert Wuest at the opening session of the National Metal Trades Association convention, held last week at the Hotel Astor, New York City, sounded the keynote of the meeting, which was one of the most remarkable in the history of the organization. The routine business coming before the convention was speedily disposed of, and practically the whole of three sessions, not including the evening gathering, was given over to the consideration of one or another of the various plans designed for the bettering of the workingman's condition and the fostering of a more sympathetic spirit between the employing class and the employes. A dozen speakers, of sufficiently broad experience in this field of endeavor to discuss some phase of it with authority, were present to address the convention, and the ensuing discussions were vigorous and of an eminently practical nature. The trend of the entire gathering was in this direction, a fact which was noted by the newly elected president, Howard P. Eells, who referred in his remarks of acceptance to the "broadened view" with which the association had come to regard the labor problem, and by George F. Steedman, of St. Louis, who pointed with gratification to the fact that "the association, though organized for defense, has progressed to such a stage that its work is now largely constructive."

The New Officers.

The nominations for officers announced in THE IRON TRADE REVIEW of March 25 were unanimously accepted. Owing to the fact that the recent changes in the constitution and by-laws increased the membership of the administrative council from 12 to 16 members, two of the members whose terms expired with the present convention were continued for another year. The officers and councillors are as follows:

Officers.

President, Howard P. Eells, the Bucyrus Co., South Milwaukee and Cleveland.

First vice president, J. H. Schwacke, Wm. Sellers & Co., Inc., Philadelphia.

Second vice president, Henry W. Hoyt, Great Lakes Engineering Works, Detroit.

Treasurer, William Lodge, Lodge & Shipley Machine Tool Co., Cincinnati.

Commissioner (appointed), Robert Wuest, Fourth National Bank building, Cincinnati.

Councillors, Term Expiring 1910.

P. B. Kendig, Seneca Falls Mfg. Co., Seneca Falls, N. Y.

M. K. Bowman, Griscom-Spencer Co., New York City.

Herbert Rice, the Waverley Co., Indianapolis.

E. P. Robinson, the Atlantic Works, East Boston, Mass.

W. A. Layman, Wagner Electric Mfg. Co., St. Louis.

George Mesta, Mesta Machine Co., Pittsburg.

Councillors, Term Expiring 1911.

R. D. Reed, the H. B. Smith Co., Westfield, Mass.

Henry Sharpe, Brown & Sharpe Mfg. Co., Providence, R. I.

Edgar McDougall, Allis-Chalmers-Bullock, Ltd., Montreal.

F. C. Caldwell, H. W. Caldwell & Son Co., Chicago.

L. H. Kittredge, Peerless Motor Car Co., Cleveland.

B. B. Quillen, Cincinnati Planer Co., Cincinnati.

Honorary Councillor.

M. H. Barker, American Tool & Machine Co., Boston.

President Copeland's Report.

The convention was welcomed to New York City by Hon. Patrick H. McGowan, president of the board of aldermen. The usual convention committees were appointed, and the remainder of the opening session was devoted to the reading of the various official reports. That of President F. K. Copeland referred to the past year as one "singularly without incidents of the kind that have held the attention of the association during the years immediately preceding," ascribing the industrial peace partly to industrial conditions and partly to the reputation of the association for "fighting to a successful conclusion all unfair and unjust demands." The report further noted the remarkably strong position of the organization at the close of a year of depression, both financially and in point of membership, and continued:

Quiet times are those which try the real worth of an organization like ours. When trouble is on, or threatened, it is not difficult to get members and hold them, as the natural human tendency is to run to cover when a storm is brewing. But it requires constancy of purpose and definiteness of aim to go on perfecting and improving the details of an organization during periods of quiet, so that, when trouble comes, relief is ready and prompt.

President Copeland noted the active interest taken in industrial education matters by the membership, reviewing the valuable work being done all the way from the isolated shop with its night school for apprentices up to the co-operative courses at the University of Cincinnati and at the Lewis Institute in Chicago, where 40 boys are now enrolled. He referred to the effective work carried on by the joint representative of this association with the National Founders' Association in connection with efforts of the labor interests to secure national legislation in their favor, adding:

In my judgment the ideal relation would be to have as president of both associations one strong, able, wise man, whose entire time would be devoted to the problems that confront us; keeping the individuality of both, their organizations and their finances separate and distinct as they now are.

The question of legislation, both state and national, bearing upon labor matters, is a subject that must receive our most earnest attention. National legislation can best be handled by national organizations. * * * In all

matters of legislation it is, I believe, our duty to be more than obstructionists. Conditions are changing all the time. We must recognize this, and, when departures from existing conditions are proposed, we must be willing to help, placing ourselves in position to see the point of view of the other side, advocating that which is fair and right and opposing that which is wrong. With a policy of this kind, we shall be able to prevent radical action that may be disastrous and improve conditions that have been outgrown owing to our rapid industrial advance.

The grave question confronting us, as I see it today, is whether we are wise enough, progressive enough, generous enough to treat our non-union or independent workman so that he can feel that he is better off outside the union than in it. If this cannot be done, we shall always be in a state of armed neutrality; if it can be, we shall be building up an army of defenders of the open-shop principle.

Commissioner Wuest's Report.

The report of Commissioner Wuest disclosed the strong financial and physical condition of the organization, which at the present time has a membership of 733 concerns, a net loss during the depression period of the past year of only eight concerns. During the year the labor bureaus of the association registered 76,386 applications for work and secured positions for 7,837. There are now on file at these offices the records of over 291,000 workmen coming under the classification of the association. The commissioner reported that but one small strike case came to the attention of the association during the year, as "conditions were such that it would have been unwise for labor organizations, merely to demonstrate their strength, to hazard the employment of their members by calling strikes to enforce unreasonable demands." Further along in his report, he said:

Our records show that periods of industrial depression such as the one just experienced, are fruitful, for the labor organizer, for the reason that during times of great business activity the average workman, especially if he is not affiliated with any labor organization, is too busy to pay any attention to the importunities of the labor organizer, whereas a depression in business creates a feeling of unrest which, as a rule, upon the resumption of business, is apt to be followed by many labor difficulties.

Arbitrary action and lawless methods are the greatest menaces to industrial welfare, and there is but one practical means for employers to adopt for the preservation of economic conditions which are so very essential to success and prosperity—and that is by making common cause, not against the organization of labor for legitimate ends by legitimate means, but against arbitrary action and lawless methods, and last, but not by any means least, irresponsible leadership.

HOWARD P. ELLS,
President.

Aid for Winona School.

The association took action authorizing the administrative council to enter into an agreement with the Winona Technical Institute, Indianapolis, for the operation of a school for the training of young men for the metal trades. The association is to pay the institute $2,000 annually for four years, and an additional $1,000 is to be raised each year in the immediate Indianapolis district during that period. Members of the association already have made generous gifts to the institute in the way of metal working equipment. This decision was reached after William Lodge, of Cincinnati, had reviewed in detail the aim of the Winona school and of its negotiations with the association for the establishment of a training school for machinists.

At the suggestion of E. H. Hargrave, president of the Cincinnati Tool Co., the association adopted resolutions expressing its gratitude to Mrs. Mary M. Emery over her recent gift of $500,000 to the Ohio Mechanics' Institute, Cincinnati, as a memorial to her husband, the late Thomas J. Emery. This message will be conveyed to Mrs. Emery by a committee from the association.

Alliance with Founders.

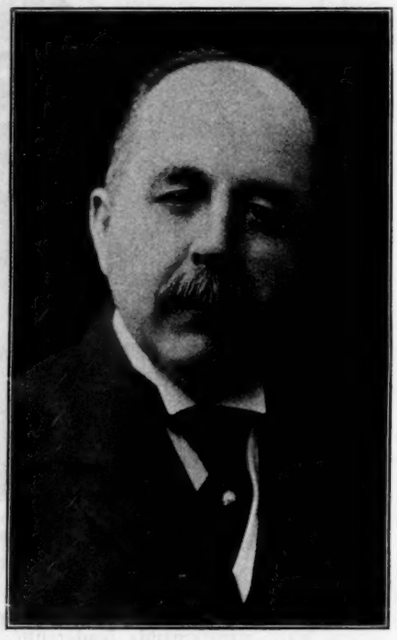
The suggestion of President Copeland that a joint executive be provided for the National Metal Trades Association and the National Founders' Association was followed by considerable discussion on the convention floor. M. H. Barker, for the committee appointed to meet jointly with a similar committee from the National Founders' Association on matters of common interest, reported that several meetings had been held and effi-

cient work had been done by the representative of the two associations in legislative matters at Washington. Immediately preceding the gathering, a meeting of the joint committee was held to discuss the question of merging the executive offices, and the project was regarded with sufficient favor to warrant the introduction in the convention of a resolution requesting the standing joint committee to meet with the administrative councils of the two associations to consider the feasibility of the plan as well as means for putting it into effect. This was adopted with the provision that the proposed change should not materially alter the constitution or by-laws of the association and that it should not become effective until ratified by the organization, either at the next convention or by a mail ballot. Through the medium of the joint committee, the two associations have been co-operating on matters of common import for the past three years, each association having the chairmanship of the joint body six months of the year. One of the important actions recently taken along this line was the merging of the publications put out by the two associations into *The Review.*

An Apprenticeship Plan.

The session of Wednesday afternoon was featured by the presentation of a paper on "The Importance of Apprenticeship Systems," by E. P. Bullard Jr., of the Bullard Machine Tool Co., Bridgeport, Conn. This paper appears elsewhere in this issue. It was productive of a lively discussion, participated in by F. B. Farnsworth, New Haven, Conn.; W. A. Viall, Providence, R. I.; Charles Fosdick, Fitchburg, Mass.; William Lodge, Cincinnati; H. N. Covell, New York City; F. H. Stillman, New York City, and others. Mr. Fosdick called attention to the excellent results secured by the installation in the Fitchburg high school of a co-operative training course, based on that worked out by Prof. Schneider, at the University of Cincinnati, and secured chiefly through the efforts of Daniel Simonds, of the Simonds Mfg. Co. Attention was also called to the newly dedicated technical high school at Cleveland, a municipal institution costing about $500,000. An earnest plea was made by Mr. Viall, secretary of the Brown & Sharpe Mfg. Co., Providence, for every member to make some efforts along the line of training boys for the machinist's trade. "Go home," he said. "Get a few boys together, put a capable man over them and go to work." Several speakers mentioned the extent to which the automobile manufacturers are scouring the country for skilled machinists, but are creating none through proper apprenticeship methods, these being designated as "trade suicidal shops."

The discussion then turned to the amount of wages necessary to hold the young man during the apprenticeship term and the special inducements employed at a number of plants, chiefly in the way of bonus paid at the end of the apprenticeship, to secure steady and loyal service. The consensus of opinion seemed to be that the boys from the country, accustomed to long hours and free from



HENRY W. HOYT,
Second Vice President.

the traits developed by city life, were far more satisfactory for apprentices. The scale of payment reported at various plants and in various districts ranged rather high.

Following this discussion, at the suggestion of Mr. Lodge, the president was authorized to appoint a committee of three to draft a suitable apprenticeship agreement to meet modern conditions, and this was adopted in rather amplified form, as it is expected that at the next convention the committee will present a report covering not only the agreement, but other important phases of the question, including the proper amount of compensation. There were several speakers who pointed out the necessity of handling this entire subject in a broad and generous manner, paying particular attention to the welfare phase presented. One tendency noted was that of the American boy to accept lower wages during an apprenticeship period in the prospect of a good position at its close as against that of the foreigner, who usually has the quick money idea and has no thought beyond the immediate present.

Seth Low at Banquet.

The convention banquet, held Wednesday evening, was presided over by President Copeland, and responses were made by Hon. Seth Low, president of the National Civic Federation, who spoke of certain phases of the tariff problem and of the work of the federation; by Rev. S. Parks Cadman, pastor of the Central Congregational church, Brooklyn, and by B. D. Traitel, of the New York Building Trades Employers' Association. There was music, and by request Mr. Lodge led the banqueters in the National Metal Trades anthem, "The Smoke Goes Up the Chimney Just the Same."

Addresses on Labor Topics.

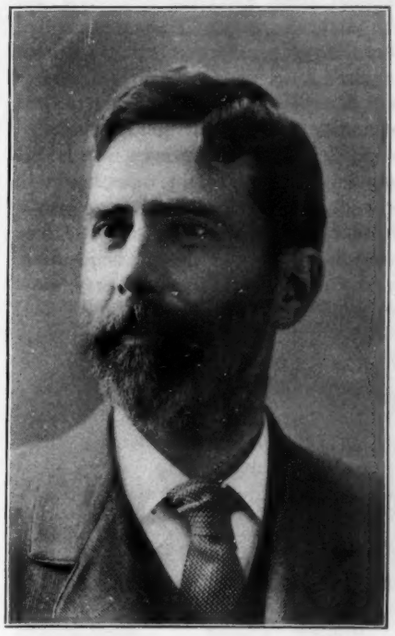
The Thursday session was largely devoted to the consideration of interesting addresses on various phases of the relationship between employer and employe. Two papers on "Profit Sharing," one by R. T. Crane, of the Crane Co., Chicago, and the other by N. O. Nelson, of the N. O. Nelson Mfg. Co., St. Louis, were read by Paul Blatchford, secretary of the Chicago branch of the association, and are presented elsewhere in this issue. E. P. Robinson, the Atlantic Works, East Boston, Mass., told of a profit-sharing plan which has been operative in that district since 1901, whereby a certain percentage of the profits of each year is set aside, held one year and then disbursed to the workmen in proportion to their wages. This plan holds before the workman for some 26 months the prospect of sharing the company's profits; it has had the effect of cutting down waste enormously and has brought about a spirit of co-operation and good feeling. The percentage of wages paid has varied from 10 to 18.

William H. Tolman, director of the Museum of Safety and Sanitation, New York city, spoke briefly on certain efforts being made in Europe, particularly at the Krupp works, for the betterment of industrial conditions, the improvement of workmen's

houses and provisions for the care of the aged. He also showed a large number of views of machinery equipped to safeguard the operator.

F. C. Blanchard, works manager of the Ashcroft Mfg. Co., Bridgeport, Conn., outlined the leading features of a "Premium System of Paying for Labor," illustrating his remarks with lantern slides. This paper will be presented in a forthcoming issue. It brought out an interesting discussion by William Lodge, who cited the inherent distrust on the part of the workman in the accuracy of financial reports eminating from the office as a reason why it is next to impossible to secure satisfactory results from a profit-sharing plan depending solely on dividends. He endorsed the premium system in glowing terms, but declared that it must be based upon a dependable cost system, and that prices, once set, should not be changed. The manufacturer must stand by his agreement not to reduce the rate of premium even if the workmen do show remarkable results, for as he stated: 'This plan, properly followed, will give you the best paid set of workmen in the whole world and yet the most profitable." Mr. Lodge insisted that provision must be made to reward the foremen, the assistant superintendent and the superintendent, stating that this will result in many suggestions for improved shop equipment and methods of operation which otherwise would not be received.

At the afternoon session papers were presented by James Wilson, president of the Patternmakers' League of North America, on "What the Workingman Wants from the Employer," by Hon. Epaphroditus Peck, of Yale University, on "Probable Changes in the Law of the Employers' Liability," and by David Gibson, editor of *Common Sense*, Cleveland, on "The Labor Question." Owing to limitations of time, there was no discussion on these papers, which appear in part in another part of this issue.



E. P. Robinson,
Councillor.

The election and installation of officers completed the business of the convention. The association noted the death during the past year of two of its most prominent members, a beautiful memorial on Edwin Reynolds being read by Henry W. Hoyt, and a tribute to the memory of William H. Pfahler being presented by J. H. Schwacke.

At a meeting of the newly elected administrative council following the convention adjournment, Robert Wuest was re-appointed commissioner. This action followed an enthusiastic rising vote of thanks tendered him by the association on the presentation of his report. The utmost good feeling pervaded the gathering. Mr. Copeland's success as president was attested by Messrs. Hargrave and Hildeth in addresses before the convention and he was presented with a handsome watch at the alumni dinner. Mr. Covell expressed the association's appreciation to Mr. Lodge for his efficient service as treasurer.

Addresses on Important Labor Topics

The convention of the National Metal Trades Association, held in New York last week, was characterized by the presentation of a number of very important papers on subjects relating to the relations of labor to capital, and of employer to employe. Several of the papers will be published in later issues of The Iron Trade Review. The address of E. P. Bullard, of the Bullard Machine Tool Co., Bridgeport, Conn., was received with much favor. Mr. Bullard spoke in part as follows:

The Importance of Apprenticeship Systems.

The financial statement of every organization, large or small, public or private, summarizes the assets and liabilities of that organization and details with more or less accuracy the items composing them. Good form in these matters forbids the inclusion of any but tangible assets and actual liabilities, yet every organization is dependent for its ultimate success on the personnel of its executive and working force, which may be an actual asset if efficient and aggressive, or a certain liability if inefficient and decadent, and might, therefore, be included in a statement of its affairs.

Efficient organization is admittedly the keynote of success. All available resources are exhausted by the modern business manager for material to construct his product, for adequate means for financing his operations, and for energetic men to develop and execute his ideas.

The successful manufacturer recognizes the fact that these men on whom he depends are an asset of his business, as much as is the capital invested; he makes provision to supplement them as necessity demands, just as he provides for a future supply of raw material, or sufficient capital to carry out his projects.

He may be able for a time to secure all the men he needs from others who have trained and developed them, as he may be able to borrow money for the development of his work, but he will have to control his own supply of both men and money before his success is assured. Every enterprise requires men skilled in the manipulation of its affairs, specialists in its particular line, versed in its various details and operations. The supremacy of an industry, a community or a nation, is dependent upon the skill and intelligence of its working people.

It is admitted by all that we need more skilled men and that some means must be devised for developing the inefficient and unskilled so that they may be valuable to themselves, their employers, and the community in which they live. Where can these men be found? The supply is inadequate to the demand. Our public schools do not educate for any particular trade; our colleges educate broadly but not specifically; our tech-

nical schools lay the foundation for engineering professions, but relatively few have opportunity to avail themselves of the courses offered.

The average child in the United States attends school for less than five years. What does this mean industrially? It means that if we are to have industrious, intelligent workers, we must devise means independent of our public school systems for training and developing them.

Raising Standard of Intelligence.

Carefully devised apprenticeship systems, successfully operated in the majority of our factories, would do much to augment the existing supply of skilled and efficient workmen.

The need to employers, of skilled workmen, has already been pointed out, but not only are they necessary as producers, but civilization itself has advanced along mechanical lines in such gigantic strides that there is a tremendous demand for, and a serious lack of, skilled men, simply to keep going the wheels of modern life. The thousands of mechanisms which are required to transport, to house, to feed, to clothe, to light, to heat and amuse the people, present an immense field for trained men.

Apprenticeship systems would insure workmen being educated along definite lines, thereby meeting the demand for competent leaders and executives. It is of the utmost importance that those who are to occupy executive positions should have familiarized themselves with the various details of the work coming under their supervision; they should be able to decide whether the judgment of their subordinates is sound, whether the various operations required to make some particular piece are correctly performed, whether the quantity and quality of production for which they are responsible is of the required standard. This knowledge can only be gained by actual contact with the work and a personal study of the conditions under which it is performed. Apprenticeship systems would offer to young men of limited means, who would otherwise be forced into that large and growing class of unskilled labor, an opportunity to learn a trade.

Poverty, disease and crime are frequently the result of ignorance and environment. Every individual, workman or capitalist, is buoyed up, spurred on, by hope. Picture to yourselves the unskilled workman, earning the minimum wage on which a man can live and support his family. His greatest anxiety is concerning steady employment for himself, his one hope, an opportunity for his children. Where is this opportunity to be found? Not in an education which yields no immediate return, for he cannot support them during that period. His sons must find work, and that as soon as the law will permit, and it must be work that will support them from the beginning, for the father cannot. This means that these boys must take situations that require little, if any skill; situations which pay practically as much at the beginning as at the end; unskilled work at unskilled wages, with no chance of advancement in either skill or remuneration. So they go on all through their life, bequeathing to their sons what their fathers bequeathed to them—ignorance and poverty, possibly disease and a tendency for crime. What have they to hope for, to buoy them up, to spur them on? Give boys of this class an opportunity to learn a trade, to be skilled workmen and in demand, rather than unskilled and in no demand, and you solve a large problem in American economics. Apprenticeship systems offer this opportunity.

Apprenticeship Systems Pay.

Do apprenticeship systems pay the employers? Most emphatically yes. Many large and successful concerns which have had apprenticeship systems in operation for a period of years are unanimous in their statements that apprentices do pay. If properly instructed and intelligently directed, their employment is more profitable than the employment of the so-called skilled workman who has been available in the past. Apprentices pay as producers during their term of service; as competent skilled journeymen foremen when they have completed their course, and as industrially intelligent foremen and executives later on.

Does It Pay the Employe to Serve an Apprenticeship?

Does it pay the employe to serve an apprenticeship? I firmly believe it does. He is raised from the ranks of unskilled labor and given an earning power which he could not otherwise command. He is taught to work intelligently and to apply his mind to his work, thus increasing his opportunity for further development and advancement.

Provisions for the Employe.

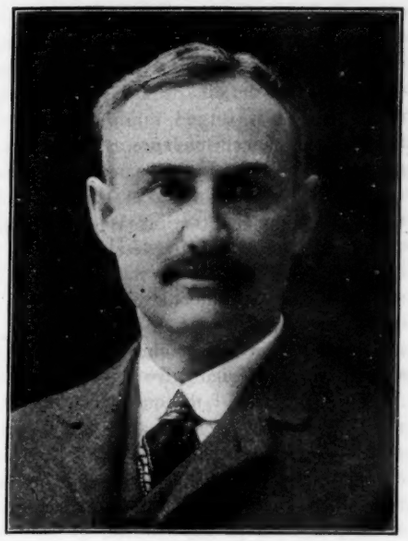
Apprenticeship systems should provide for a proper term of service to insure ample time for thorough instruction. A distinct proportion should exist between the period of time required to learn a trade and the degrees of skill required in the trade.

Apprenticeship systems should provide for sufficient remuneration to support the apprentice during his term of service. Applicants for apprenticeship courses will, in the majority of cases, come from the working classes; from the farms in many instances, and must of necessity have an opportunity for self support during their term of apprenticeship.

Apprenticeship systems should provide instruction in the technique of the trade and allied studies. The average boy begins to learn his trade between the ages of 14 and 17 years. As a rule he has not advanced beyond the fifth grammar grade, and probably could not pass an examination upon any subject which he has studied. He has not been taught to reason or apply such knowledge as he has. If he is to become a skilled mechanic, it is essential that he should be well grounded in the rudimentary studies which are allied to his trade. He should be taught at least the mathematics of his work, the technical terms usually employed, and sufficient reading, writing and spelling to supplement the deficiencies of his common school education.

Apprenticeship systems should provide instruction in the manipulation and care of the appliances of the trade. I believe there are many here who either own or are responsible for valuable manufacturing equipment which is practically at the mercy of unskilled employes or uninstructed apprentices.

The average employer would deny this statement, believing as he does that the foremen supervise and instruct their workmen and apprentices. As a matter of fact, foremen seldom have time to explain to each boy, such items as the necessity and economy of sufficient lubrication, the function of each mechanism, and the means which should be employed to attain the most economical results. As a rule, the foremen, being occupied with what are, to them, more important matters, are content to let the boy find out these things for himself—a very expensive method. Every large plant maintains a repair department at a cost which is no inconsiderable portion of its operating expense. Instruction in the care and manipulation of the appliances which



P. B. KENDIG,
Councillor.

it uses would do much to reduce this item.

Apprenticeship systems should provide the fostering of a spirit of ambition and a desire for increased knowledge. Let the apprentice see that his diligence will be rewarded, that he in his time may be foreman, superintendent, or manager, if he applies himself to his work, and no difficulty will be experienced in securing all the boys required. If there is anything in a boy, this will bring it out.

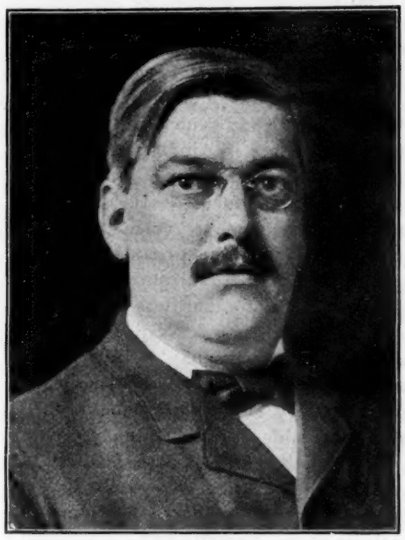
Divided Into Two Classes.

As the employes of an industry may be divided into two classes, producers and non-producers, workers and executives, and as there is need for trained men in each of these classes, I recommend that apprentice courses be arranged to meet these conditions. Let the boy who is bright and ambitious and who otherwise shows the necessary qualifications become more than a mere workman, have an opportunity to learn the full trade, including instruction in the studies allied to the trade. Impress upon him the fact that he is given an exceptional opportunity, and demand in return exceptional interest and effort.

Advance these boys systematically through the course and weed out such as are not up to a high standard. Select the executives as far as possible from among this number and thus show the boys that their diligence and efforts will be rewarded.

As the workers outrun in numbers

W. A. LAYMAN,
Councillor.



R. D. REED,
Councillor.

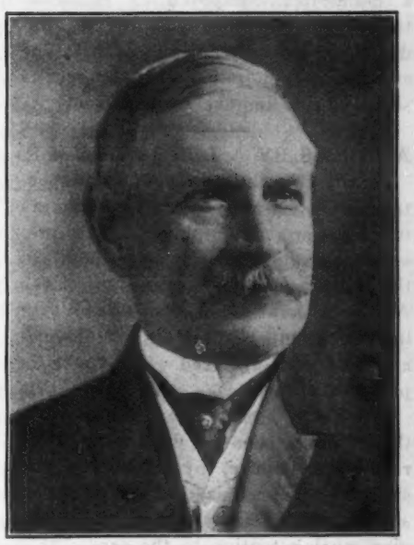
those having executive ability, it is fully as important that as much attention be paid to the development of the latter as the former. Relatively few applicants for apprentice courses have any expectations of ever becoming more than skilled specialists. Why then waste time and money in teaching the full trade to a boy who has neither the intelligence nor ambition to become more than a mere specialist? Provide special courses for these boys covering the various branches of the trade; make the time of service relatively short and wages high as compared to the full apprentice course; give graduates of these special courses an opportunity to learn the full trade later on if they show special ability; allowing credit for the time already served on the special course.

EDGAR MCDOUGALL,
Councillor.

The full apprentice course would train boys to fill executive positions. The special course would develop skilled workmen with a minimum expenditure of time and money.

What is the attitude of labor unions toward the apprentice system? No labor union having the welfare of the working man at heart can be opposed to well-organized and well-conducted apprentice courses. As well could they be opposed to our public school system on the ground that education is dangerous.

The labor union which sets its seal of disapproval upon well organized and well conducted apprentice courses admits its ignorance of industrial and social developments and requirements. It cannot have the welfare of its mem-



WM. LODGE,
Treasurer.

bers or the working classes at heart. It should be recognized as hostile to the best interests of employer and employe alike and should not be tolerated in any community. Labor unions can in no way more conclusively show their interest in the welfare of the workingman than by endorsing and furthering the adoption of apprenticeship systems and schools. The apprentice school is a necessary adjunct to any well organized apprentice system. Few concerns are large enough to support a school of their own, as is done in Lynn and Schenectady, and not every community is prepared to establish a technical school such as Winona or the University of Cincinnati. Fortunately, however, like industries usually locate in the same neighborhood, so that it is possible for manufacturers employing a similar class of labor to co-operate in the establishment and maintenance of apprenticeship schools.

In Bridgeport, Conn., this has been done very successfully. The members of the local manufacturers' association, working in conjunction with the Y. M. C. A, have established a school for apprentices, who attend class two hours per day five days a week. The boys are paid regular wages for the time they spend in the class room, and the entire expense for the instructor, who is especially employed for this purpose, is borne by the manufacturers who have boys in the school.

The Y. M. C. A. was selected as the building—which is well equipped—was provided with class-rooms and had all facilities for carrying on the work. The courses are laid out by a committee composed of manufacturers, and the work is directly under their supervision and control. The expenses are nominal and the results secured thus far are satisfactory.

ADDRESS BY A LABOR LEADER.

At the convention, the unusual spectacle of a labor leader addressing an organization of employers was presented. James Wilson, president of the Patternmakers' League of North America, spoke on "What the Workingman Wants From the Employer," and was well received. He spoke in part as follows:

What the workingman wants from the employer can be discovered most readily, I believe, by examining the subject of organization. While the student of the future will no doubt give much attention to the remarkable inventions and wonderful development in our industries which took place during the close of the nineteenth and early portion of the twentieth century, there will probably be no subject which will be of deeper interest to him than the prominent part which organizations among men played in the development of our country. In fact, the development of organization during the last 25 years has been almost as wonderful as the development which took place during the same period in our industries.

It has been through organization and practically through it alone that most of the progress we have made as a people has been possible. We are all familiar with the remarkable results which have been secured through organized effort in the prohibition movement; the steps being taken for the preservation of our forests; the improvement of our waterways; and which has worked for the purification of our municipal and state governments. These and many others are evidences of the trend to use organized effort to accomplish a result during this period and indicate what has been accomplished as the most feasible method to carry out any policy which has appealed to a group of our citizens.

It has been suggested at times by some of those who have given insufficient thought to the industrial problems of today, that organizations of employers and workmen sufficiently strong, well disciplined and broad-minded, would be able to solve what we popularly term the industrial problem. I doubt, however, the possibility of successfully solving a problem the basis for which is subject to the continuous flux of changing industries and changing conditions. What it seems to me we can do, however, is first of all to create a better feeling and minimize industrial conflicts to an extent which would largely eliminate the loss of trade, loss of money and what is even of as vital importance, the loss of shop organization, which generally follow in the wake of industrial disputes, the large percentage of which occur through the failure to get together and talk over the question at issue before hostilities begin. Under existing conditions, an industrial victory for either side is a victory dearly paid for. The employer loses time, money, trade and shop organization, and the workmen the wages they would have received.

It is needless for me to speak of the necessity of organization on the part of employers; in fact, the principles of organization underlie the successful management of our large industrial enterprises. No man has that capacity which would enable him to direct and supervise the details of a large business; this he is forced to do through foremen, superintendents, general managers, and staffs of expert assistants, and, if this is true of this business, how equally true it is that he cannot take up with his individual workmen the many questions which they desire to have considered. Your association employs a special representative and under him are trained assistants and these gentlemen give their entire time to the study of the questions which affect you as an organization. These gentlemen are your representatives in every degree similar to those who represent you on the road, in your agncies, or in the different departments of your plants; and you expect them to be recognized as such.

The members of our unions find it impossible to take up all of the questions that arise as individuals or as local unions, and the position occupied by the general officers of the trade unions and the union agents to be found in the industrial centers, is exactly similar to that occupied by the honored commissioner of your organization and his assistants. You believe that you could more successfully handle the questions which arise among your workmen through organization than as individuals, and the same reason has led the workmen to organize, for they realize that as individuals they stand almost helpless and in the case of some of the larger corporations, enjoy practically the same opportunity of making a bargain for their labor on an equal footing with the employer that the prospective recruit would have of driving an individual bargain with the recruiting sergeant when enlisting.

The Path of Peace.

Experience has demonstrated that the broad pathway which leads towards industrial peace is indicated by the sign posts, conference, conciliation and trade agreements. It is hardly necessary for me to voice the well recognized fact that organizations of employers and organizations of employes will exist regardless of the opposition which may assail them and in view of this, what is the better policy for us all to pursue? One of the necessary conditions to make business profitable is the ability to contract for the future performance of certain acts. When the employer secures a large contract, he immediately covers himself and safeguards his profits by contracting for all of the raw material required to fulfill the

contract he has entered into, but he does not do this for the most important item, the labor cost, unless he has an agreement with the organization representing the labor which he must have to convert the raw material into the finished product, which covers the item of wages, hours of labor and shop conditions, extending over a specified period of time.

Changing Hours of Labor.

The history of our industrial development, so far as the workmen are concerned, shows many changes in hours of labor, rates of wages and shop conditions, which have had a jarring and demoralizing effect because of the suddenness with which they were made. As an illustration of what I have in mind, let me call attention to the inauguration of the shorter workday which everyone has recognized as something which must come, but which, instead of being introduced gradually as it should have been, has been brought about by sudden changes which have seriously affected for the time being the productivity of the plant. Not long ago our attention was called to the tremendous struggle between the Typothetae, on the one hand, and the International Typographical Union on the other, over the establishment of an eight-hour day. Millions of money was spent by the union men, millions lost to the employers and the eight-hour day eventually established in the great majority of the plants, and when it came, it was a sudden reduction of the hours of labor from nine and in some instances from 10 to eight hours.

How different have been the steps taken by one employers' organization, the Metal Trades Association of California, and the Metal Trades Union, of San Francisco. Instead of flying at each other's throats or insisting that all that each side desired should be immediately granted, they first admitted that an eight-hour day would eventually exist, that there were no fundamental reasons why the eight-hour workday should not exist. When once this conclusion had been reached, they decided the change should be made in such a gradual manner as not to upset the basis of productivity and so cover a period of three years, during which the workday was to be gradually reduced until the eight-hour day had been reached.

The California Plan.

I cannot resist the desire to quote Mr. Davis, the commissioner of the association just mentioned, with reference to the agreement, who said in a recent report:

"To try to stem the tide of the trade union movement on this coast is as foolish as it is absurd. Whom do you choose as a 'close working partner'—the paid spokesman for skilled union mechanics or the high salaried professional strike-breaker, with his coterie of itinerant or so-called independent workmen, but who, in reality, as has been demonstrated from costly experiences on this coast, are inferior mechanics, ever on premium wages bent?

"When employers cease to collaborate with union workmen, they are working against them and thereby invoke retaliatory measures of a more insidious character than of which they know. This has often been the result of action taken to impose shop rules not compatible with conditions in a given territory.

"What has not been accomplished by coercion, however, has often been attained through intelligent co-operation, resulting in increased efficiency on the part of the workmen themselves, and the prevention of strikes on the part of their business agents. When cultivation of closer acquaintanceship between employers begets confidence where it was formerly lacking, why should not the rule be equally applicable to the employers' and the employes' representatives? But these representatives cannot act for disorganized interests."

After some further discussion of the agreement, Mr. Davis said: "Hours and wages, settled; equitable conditions in work shops, secured; membership of association, strengthened; calling out of men on least provocation stopped; petty jurisdictional disputes, abolished; complaints of discrimination (when made), amicably adjusted; influence of association, increased; the sum total of these agencies of peace represents the expenditure of concerted energy to a greater extent than probably estimated by any one individual or set of individuals, and augurs well for the future of the real constructive work now before us."

Other Agreements.

I could recite similar expressions and discuss some of the satisfactory industrial bargains between trade unions and organizations of employers, such as that between the typographical union and the newspaper association; the glass bottle blowers and their employers; the iron molders' union and the stove founders; the miners and the interstate agreement and others, but time does not allow this.

I have endeavored to indicate the necessity of organization dealing with organization, if organizations are to exist in our industries and prove of any permanent value. I have endeavored to call your attention to the fact that organizations cannot hope to deal successfully through their organizations with individuals; I have tried to indicate that the best conditions can only prevail in our industries through agreements between organizations representing the employers and the employes, with conferences and agreements is born the "get together spirit" and the elimination to a large degree of industrial conflicts.

We have perhaps allowed our minds to become clouded to the real questions through the rallying cries which have been adopted. We have been prone to adopt sets of principles fundamental perhaps in themselves, but which we have at times lamentably failed to interpret and apply in a spirit of broadness and with justice to each other. Much of this has been done in connection with what has been miscalled the "open shop." There is no gainsaying but that the employer has a right to hire whom he pleases, he has the right to pay whatever wage he desires, regulate the hours of labor and shop management solely in accord with his wish. No one can successfully deny this right, but it is equally true that the workman has a similar right to demand whatever wages and conditions he desires and if the employer and the employe, one depending upon the other, insist upon the enjoyment of all of their rights, without giving adequate recognition to the rights of the other, then surely the principles which we have used to guide us have not resulted in establishing justice and, therefore, cannot bring about or maintain industrial peace.

In conclusion let me say that the object of the trade union movement is the improvement of mankind, the elevation of the workman's standard of living upon which our civilization must rest. How to accomplish this without infringing upon the rights of others is as yet an unsolved problem, and in this age of organization it would appear that the steps towards its solution must be taken through conferences and agreements between the parties affected, rather than through the policy of an organized effort to force one group to deal as individuals with an organized body.

ANALYSIS OF POWER CONSUMPTION IN A ROLL PASS.

By G. A. Merkt.[1]

Since the development of large electric motors and their more general use in connection with modern drives for rolling mills the mill designer has met with a more rigid necessity to pre-determine the performance of his mill in regard to its power consumption, not only as a total or a maximum, but even to momentary, perhaps ever changing cyclic quantities. In other words, the builder of the electrical apparatus must have a load curve preferably for the duration of one piece going through the entire mill. This may be styled the cycle of the mill and with the number of cycles or number of pieces to be rolled per time unit known it will be comparatively easy to decide on the type, size and construction of the motor and its accessories which are to drive the mill.

The writer has had the opportunity to examine various methods of power calculation in connection with rolling mill work, and while there are methods, based upon actual tests, which are perhaps adequate for practice, it has occurred to him that it be possible to analyze the forces, pressures, velocities, etc., in a roll pass which are consuming the energy supplied to the latter in a mathematical and yet simple manner.

Rolling experts in general agree that for a given reduction it takes less power to roll with rolls of small diameters than it does with rolls of larger diameters, and it is this fact which has led the author to develop a power formula that takes in consideration the roll diameters as well as the reductions. For the sake of simplicity we will consider a flat going through a pass. Examining Fig. 1, it may then be noted that the contact surface of the piece in the pass increases with the diameter of the roll in direct proportion (this, however, does not mean that the power consumption is in proportion to the size of the rolls). The restraining elements in a roll pass are composed of the resistance of the material to deformation at the rolling temperature, which may be assumed to be nearly equal its crushing strength for that temperature, and the surface friction which is caused by the difference in speeds of the roll surface and the various points of the piece in the pass. Evidently somewhere between points a and b, or between a_1 and b the piece is moving with the same speed as the roll surface, and we assume this to be the case half way between these two contact terminals, i. e., at the cross section m m in Fig. 2. This assumption may not always be strictly correct, as was demonstrated by J. Puppe in *Stahl u. Eisen,* Feb. 3, 1909, where it is shown that the lead of the piece over the roll surface speed is greater for harder stocks, lower temperatures and greater reductions, and may amount to as much as 10 per cent. For the following calculations we may, however, adhere to the proposed assumption.

Granting now that there are no other resistances outside of those in the pass proper to be taken care of, such as friction in the roll necks, gear friction and that of conveying the piece on its way through the pass, a pull P will be required to force the piece from one side of the pass between the frictionlessly turning rolls to the other side. This pull P produces, according to Fig. 3, a normal pressure N on each side of the piece in contact with the rolls which represents the resistance of the

[1] 8 Blair street, Worcester, Mass.

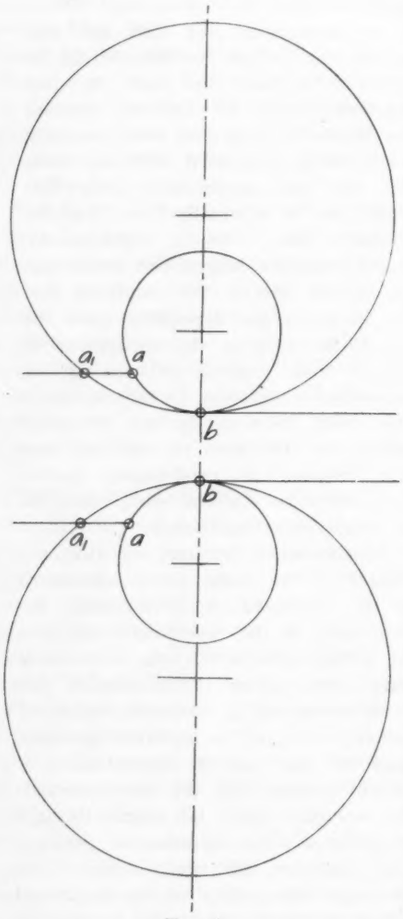


Fig. 1.

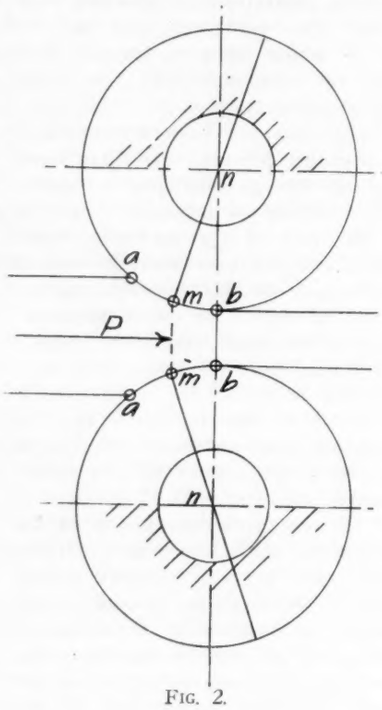


Fig. 2.

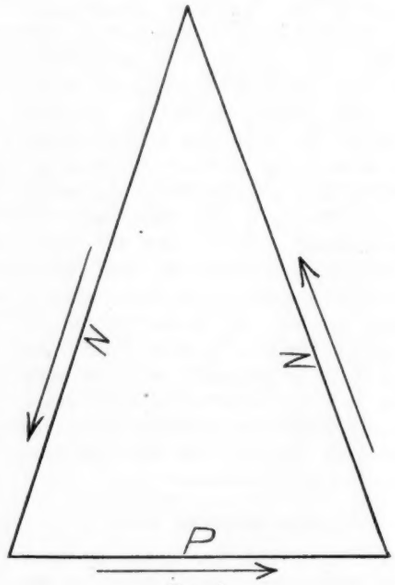


Fig. 3.

material to deformation plus a certain amount due to a portion of P necessary to overcome the surface friction. The horsepower required to purely roll the piece in the pass in consideration would then be

Equation 1:

$$E_r = \frac{P_2 R \pi n}{12 \times 33{,}000} \text{ H. P.}$$

Wherein: 2R=roll diameter in inches; n = number of revolutions per minute; P = force with which the piece is pulled in cross-section mm at the surface speed of the rolls.

We will next endeavor to show in what way and to what extent the value of P is dependent upon the roll diameter and the reduction of the piece in the pass (see Fig. 4).

The resistance P which is offered by the flat in going through the pass sets up a horizontal pressure

Equation 2:

$$H = \frac{P}{2}$$

in each of the roll necks to be taken care of in the windows of the roll housings in the form of bending moments. It furthermore produces a normal pressure N in the neck bearings which is in the same proportion to H, respectively

$$\frac{P}{2}$$

as ab is to db.

Equation 3:

$$\frac{N}{\frac{P}{2}} = \frac{\sqrt{P\,(t_1 - t_2)}}{\frac{t_1 - t_2}{2}}$$

$$N = \sqrt{\frac{R}{t_1 - t_2}}$$

The resultant of H and N is a compressive stress, half of which each cap screw of the two roll housings is subjected to:

Equation 4:

$$K = \sqrt{N^2 - H^2}$$

Thus we find that the only force which determines the power consumption of rolling the piece is N, while its components H and K are merely stresses in certain parts of the machinery. If we now propose to record N for future applications or new mill problems similar to the one the test was made on, it will be most practical to reduce its value to that per unit area of the projected contact surface which latter may be expressed by Equation 5 wherein: w_1 = width of piece before entering pass, in inches; w_2 = width of piece after leaving pass, in inches, and signifying the combined normal pressure per square inch of this contact surface by the letter C. we have:

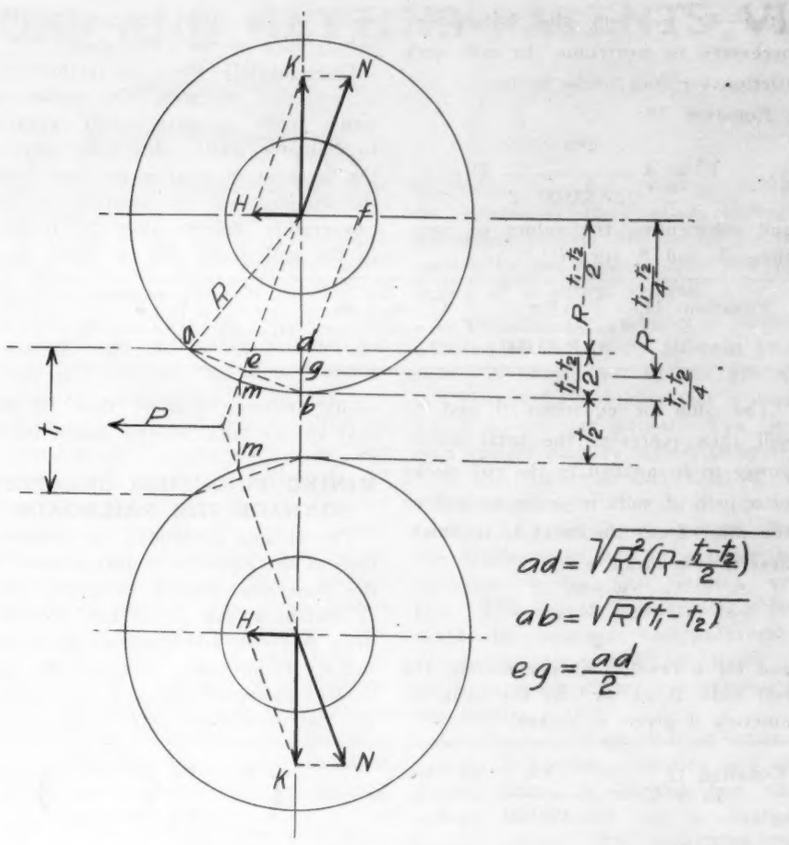


FIG. 4.

Equation 6:

$$C = \frac{N}{\sqrt{R\,(t_1 - t_2)}\left(\frac{w_1 + w_2}{2}\right)}$$

Using the value of Equation 3, and substituting same for N in Equation 6, we find

Equation 7:

$$C = \frac{P\sqrt{\frac{R}{t_1 - t_2}}}{\sqrt{R(t_1 - t_2)}\left(\frac{w_1 + w_2}{2}\right)} = \frac{2P}{(w_1 + w_2)\,(t_1 - t_2)}$$

and Equation 8,

$$P = C\,\frac{w_1 + w_2}{2}\,(t_1 - t_2)$$

Substituting this value for P in our original Equation 1, we conclude that any pass of our new mill having a reduction of tw — tw square inches, and notwithstanding bearing friction, etc., will take in horsepowers:

Equation 9,

$$E_r = \frac{2R\pi n}{12 \times 33{,}000}\,C\,\frac{w_1 + w_2}{2}\,(t_1 - t_2)$$

In the foregoing we have shown that the power consumption of purely rolling or reducing the piece is directly proportional to the mean width of the piece which is a function of the spreading, and to the difference of initial and final thicknesses, a function of the reduction, and would remain the same for any size roll diameter inasmuch as we neglect the variations in the lead of the piece over the surface speed and provided the surface speed of the rolls or the output of the mill were kept constant.

This is different if we now investigate the bearing friction or rather the power consumption in the bearings for the roll necks (see Fig. 5). Signifying the co-efficient of friction for these bearings by the

---

Equation 5:

$$ab \times \frac{2}{w_1 + w_2} = \sqrt{R\,(t_1 - t_2)}\left(\frac{w_1 + w_2}{2}\right)$$

letter F, we find the horsepower necessary to overcome the roll neck friction for four necks to be:

Equation 10:

$$E_f = 4 \frac{d\pi n}{12\times 33{,}000} \frac{N}{2} F$$

and substituting the values of equations 3, and 8, for N:

Equation 11,

$$E_f = 4 \frac{d\pi n}{12 \times 33{,}000} F \frac{C}{2} \frac{w_1 + w_2}{2} (t_1 - t_2) \sqrt{\frac{R}{t_1 - t_2}}$$

The sum of equations 9 and 11 will then represent the total horsepower to be applied to the roll necks of a pair of rolls in order to reduce the piece from thickness t_1 to thickness t_2 at a mean width

$$\frac{w_1 + w_2}{2}$$

and for n revolutions per minute, the roll radii R as well as the neck diameters d given in inches:

Equation 12,

$$E_r + E_f = \frac{\pi n}{198{,}000} \frac{w_1 + w_2}{2} (t_1 - t_2) C \left(R + Fd \sqrt{\frac{R}{t_1 - t_2}} \right)$$

We are thus able to explain why a large pair of rolls takes a somewhat greater amount of energy for the same performance than does a smaller pair of rolls and note that it is due to a greater friction loss in the roll necks, which, at constant surface speed of the latter increases as the square root of the roll radius.

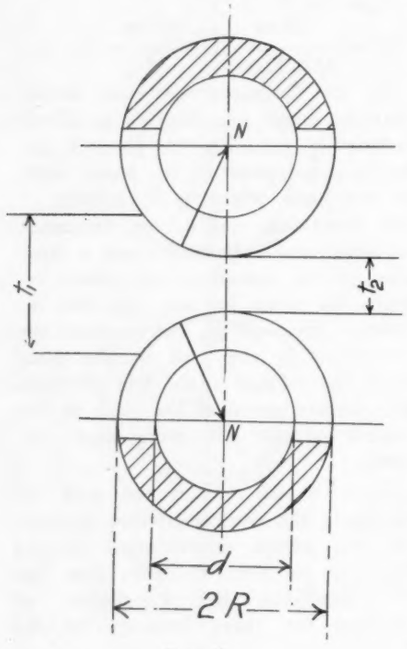


FIG. 5.

Unfortunately there is furthermore a tendency to make the necks of larger rolls proportionately greater in diameter which adds materially to the increase in total power and from the construction of equation 12, we can readily observe that the friction in the roll necks can in some cases easily amount to more than 50 per cent of the total energy consumed.

MINING FURNISHES GREATEST TONNAGE FOR RAILROADS.

The volume containing the proceedings of the eleventh annual session of the American Mining Congress, held at Pittsburg, last December, has just been received, and contains many articles of interest. Among the addresses delivered was one by Edward H. Harriman, who gave some interesting facts concerning the tonnage of freight hauled by railroads, showing that the crude products of the mines furnished 53 per cent of the total freight tonnage handled by the railroads of this country during the year ending June 30, 1906, while the manufactured products of the mines furnished an additional 11 per cent; so that the mineral products furnished for that year 64 per cent of the total amount of freight carried by the railroads.

During the same year the products of the forests furnished 11 per cent of the total; agricultural products 8 per cent, and manufactures other than from mine products 4 per cent; which comparison brings out very clearly the overwhelming magnitude of the mining industry.

Mr. Harriman stated that the miner and the railroad builder are the two great advance agencies which make possible the immense industrial development which has occurred between the Alleghenies and the Pacific coast during the last 60 years.

Senator Charles Dick, of Ohio, in an able address pointed out the necessity that existed for the creation of a bureau of mines by the government. Mr. Dick has been the champion of this bill in the senate for several years.

DECISIONS AS TO TARIFF RATES.

The circuit court of New York district recently decided two issues before it. In the first, it held that a steel slab in the form of a table top, 15 feet long, 4 feet wide and 6 inches thick, weighing 13,384 pounds and worth 17,850 marks, engraved and used to impress the pattern on plate glass which is pressed against it, is dutiable at 45 per cent as a manufacture of metal under paragraph 193. It was claimed that the assessment should be 4.7 cents per pound under paragraph 135 as "steel in all forms and shapes." In the other, it was held that steel ornaments used for millinery purposes were dutiable under paragraph 135 at above rate as "pressed, sheared, or stamped shapes," and not under paragraph 193.

The secretary of the treasury has announced his acquiescence in the court of appeals ruling that steel cylinders 19 feet by 4 feet and 35 x 8 are dutiable at 35 per cent under paragraph 152.

The board of United States general appraisers at New York has held:

(1) That steel railway crossings are not dutiable as ingots at 4.7 cents per pound or less under paragraph 135, but at 45 per cent under paragraph 193.

(2 That a self-heating smoothing iron equipped with heating apparatus and alcohol reservoir, is dutiable at 45 per cent. The claim at 0.8 cents per pound as cast iron andirons under paragraph 148 was accordingly overruled.

The Dunbar Furnace Co.'s No. 2 stack at Dunbar, Pa., made 1,947 tons last week, the best day being 320 tons. This stack made 22,142 tons for the first three months this year, and is now averaging about 275 tons daily. It runs on foundry, forge, basic, car wheel and malleable grades, and so far this year has not made a pound of "off iron," operating on a fuel ratio of 2,110 pounds. Semet-Solvay by-product coke made at Dunbar is used exclusively as fuel by the furnace and foundry, and the average sulphur of the pig iron is about 0.037. Besides the one furnace stack and 110 Semet-Solvay by-product ovens, the two coal mines adjoining the ovens, the sand mills of the Dunbar Furnace Co. and the Continuous Glass Press Co.'s wire glass plant are all running.

The Embree Iron Co. blew out its Embreeville, Tenn., stack March 17. The plant was placed in the hands of receivers.

MAKING INVENTIONS AND GETTING PATENTS—VI[1]

Infringement

By John D. Morgan.[2]

Some inventions are of such a nature that they can be protected by keeping them secret. Certain processes used in the manufacture of ceramics are so protected. The alloying of steel so as to obtain a product of superior hardness was so protected for a time. Certain discoveries might be made which would not fall under any of the legal classes to which the law extends patent protection. Obviously secrecy is the only protection in a case of this kind. Where the invention is a process which does not leave its identifying marks in the product, it is quite obvious that the detection of infringement would be at least difficult.

While, therefore, it will be apparent that there are some inventions or discoveries which should be preserved in secrecy, it is practically a uniformly safe rule to patent everything for which there is not a distinct reason for not patenting.

Some of the reasons for this are that the patent grants valuable rights that the owner of the trade secret cannot avail himself of. The patentee can impose restrictions upon the seller as to manner of sale, price and other features; he can impose restrictions upon the user, such as compelling him to buy his supplies from the patentee or someone designated by him. Such rights, it may be seen at once, may be of great value, and certain large concerns are reputed to have realized the greater part of their profits through the sale of supplies.

The owner of the trade secret does not enjoy these advantages. An absolute and almost unparalleled monopoly is granted to the patentee, but for a brief period only, as a consideration for the full publication by him of his invention for the general enjoyment and benefit of the public as soon as his patent shall have expired. The public receives no such benefit from the owner of the trade secret, for he and his successors may reap the benefits thereof for an indefinite period of time. Furthermore, when they cease to reap the benefits, there is no assurance that the public will participate in them. The secret may be lost or merely pass to others without any communication to the public.

Not only is the owner of the trade secret shut out from valuable privileges enjoyed by the patentee, but he is not protected from anyone who may through fair means gain possession of his secret. If he is manufacturing a composition of matter and another man is sufficiently skillful to ascertain the components by fair means, such as chemical analysis, no remedy exists against him for the original owner of the trade secret. However, the owner of a trade secret is protected against loss through breach of trust or any unfair means used to wrest his secret from him. He may prevent its use by those to whom he has given it in confidence, such as employes, and may enjoin them from further use or communication of it and may secure damages where he has suffered any through such breach of trust.

Foreign Patents.

With many manufacturing concerns the question of whether foreign patents should be taken out comes up for consideration. The status of patents in these countries is not a determining factor with some concerns because their interests abroad are so important that they must needs take out patents and secure the best protection possible, whether it be adequate or not. With other concerns, however, the question of what protection can be obtained abroad is vital and sometimes determining.

In England, until recently, Jan. 1, 1907, there was no examination of applications for patent on the part of the government to determine whether or not the claims were for novel subject matter. Since that date, there has been in England an examination, quite limited in scope, however, for the purpose of passing upon the novelty of patent claims. The applicant was left to his own judgment in defining his invention and at his own peril as to having his patent declared invalid by the courts. The system which grew up in England under this practice is roughly similar to our own in that it permitted what may be termed interlocking patents. In other words patents for improvements were issued which might be dominated by the claims of other existent patents, the owners of which might through the courts prevent the use of his invention by the inventor after the securing of a patent thereon.

In Germany the granting of patents is based on an entirely different principle. A patent will not be granted in Germany for anything that is dominated by another patent. The German system may be styled, compared with the American and English, as non-interlocking. That is, if a patent be issued by the German patent office the applicant is free to practice his invention within the German empire. This system is exceedingly favorable to improvers and unfavorable to earlier inventors, as under it much narrower claims are granted in any specific case.

Another feature of contrast between nearly all foreign countries and the United States is in the fact that abroad an annual tax is charged against patents. The underlying theory is that where patents are not exploited and made a source of profit to the owner, he will refrain from paying the tax and the patents will thus be forfeited and the improvement thrown open to the art or craft generally.

These taxes are as follows in England, Germany and France:

Year.	England, pounds.	Germany, marks.	France, francs per year.
1	..	50	100
2	..	50	...
3	..	100	...
4	10	150	...
5	10	200	...
6	10	250	...
7	10	300	...
8	15	350	...
9	15	400	...
10	20	450	...
11	20	500	...
12	20	550	...
13	20	600	...
14	..	650	...
15	..	700	...

This system of annual taxes, increased in some relation to the age of the patent, is not without some good features from the viewpoint of the public in that it prevents the continuance in force of non-commercial patents, or of those which, though commercial, the owner fails to develop. This condition exists very largely in respect to United States patents and in many of its aspects is admittedly pernicious. On the other hand, the system is undesirable in that it imposes an equal burden

[1]Final article. The preceding articles of this series were published in The Iron Trade Review of March 18 and 25, April 1, 8 and 15.

[2]220 Broadway, New York; member of the New York Patent Bar.

upon the inventor of small things with the inventor of large things and makes no allowance for inventions which are slow and difficult of exploitation.

One of the most formidable things in connection with the taking out of foreign patents is the requirement that the patent be "worked" in the country where patented. Just what this working means it is difficult to determine. The German law on this point has been in existence for some years and many American patentees have complied with it to the extent of advertising the invention in a certain number of German trade journals, inviting correspondence and proposals for the manufacture of the patented thing. So far as I know, no German court has ever declared a patent invalid on the ground that such a working was not a compliance with the law. Where patents are of great financial value in Germany, of course no such nominal working is trusted, but an actual working is secured.

The English law is but a recent enactment and hardly sufficient time has elapsed as yet for a judicial construction of what the required working should be. There seems to be a feeling that this nominal working practiced in certain cases in Germany will not be tolerated in England and that the actual working will be insisted on. This will certainly be the case if the influences which brought about the enactment of the law by parliament will be heeded by the courts to an equal extent. Some authorities, however, lean toward the opposite opinion. So far it is but a matter of opinion and must await judicial decision for its determination.

At the present time, correspondence is in progress between the United States government and certain foreign governments looking to a waiver of such workings in view of the non-enactment by the United States of a corresponding law. It is not possible to state at this time what the outcome of it all will be, but as there is considerable importation among certain lines to the United States of articles covered by patent, it is possible that some understanding will be reached which will be more favorable to American inventors taking out patents abroad. Up to the present time, however, there is little fact upon which to base such a hope.

There is also some consideration of the advisability of passing a law in the United States compelling foreign inventors to work or manufacture their inventions here as a requisite to holding a valid patent.

In Canada an actual working within two years is required, but a patentee may, if he so desire, within six months after the issuance of his patent, place the patent under what is known as the compulsory license clause. That is, he must enter the patent as being subject to compulsory license upon application by anyone to the proper governmental authorities, the rate of compensation to be decided by them.

While this information is given, and may be to some extent a determining factor with certain concerns as to whether or not they shall take out foreign patents, the dominant consideration, of course, will be whether the foreign business will be sufficient to justify the expense of foreign patents. Where the opening of a foreign line is contemplated, the patent expense must be alongside that of advertising, agency, etc., as a part of the main venture.

The best way for taking out foreign patents is to consult a competent attorney in the United States who in addition to his information and experience on the subject is generally in communication with the best available professional talent in each of the foreign countries.

The foregoing has been presented in a form which it is hoped will make it of value to working inventors and those owning or handling patents for commercial purposes, as well as for those who have not, but who should, take out patents. The whole has been stripped of technicalities and some of the statements are in the nature of general approximations, but this form will doubtless be more serviceable than would be a minute, technical and long drawn out endeavor to present the entire subject in its full details.

It is submitted in the hope that it will provide information which the writer, from his personal experience, believes is generally needed and is yet very widely lacking.

With the acceptance by federal court authorities of the report of Benjamin Strong, Jr., as receiver of the Sheffield Coal & Iron Co., and his discharge, the re-organization announced several weeks ago becomes effective. It is probable that furnace activities will be resumed in the early future. The new officers and directors of the re-organized company were published some weeks ago.

THE TAYLOR MECHANICAL STOKER.

The accompanying illustrations present, respectively, front and side views of the Taylor gravity underfeed automatic stoker, which, within the past year or two, has met with considerable success in steam boiler installations where heavy duty and large overload capacity are daily conditions, together with a requirement for maximum efficiency in the combustion of the fuel. The stoker, while operating on the underfeed principle, presents a number of radical departures in design and construction, which tend to make it a remarkably efficient machine, and also one that insures almost perfect smokeless combustion.

As seen from the illustration, Fig. 1, it comprises a set of sloping piers, which are, approximately, V-shaped in plan. Between each pair of piers are two rams for feeding coal, the upper one having a movement of about 10 inches, which travel is fixed, while the movement of the lower ram ranges from two to three inches, being adjustable to suit the varying conditions imposed by the variable ash contents of different fuels.

Each pier or retort, as it is technically known, is composed of hollow blocks and forms in effect a wind box, through which the air for combustion of the fuel is forced. Air cannot be admitted to the fire, except through these retorts. Tuyeres are formed in the nose and on either side of each V-shaped block composing the retorts, so that the air for combustion is blown under pressure and brought in intimate contact with all parts of the fire. The air supply is provided by a blower, which is driven from the engine operating the stoker, so that its quantity is automatically varied with any increase or decrease in the load on the boiler. The speed of the engine is regulated by an automatic valve governed by the steam pressure in the boiler.

It is in the method of feeding coal that this stoker presents its unique features. While the coal is fed from the top of the stoker, it nevertheless operates distinctly on the underfeed principle. Coal is placed in the hopper shown at the upper part and drops down in front of the upper row of rams. These push the green coal underneath the bed of hot coke already formed and the volatile gases distilled from the green coal are brought into intimate contact with the air flowing through the tuyeres. The gases and air then pass through the bed of hot coke and perfect combustion is effect-

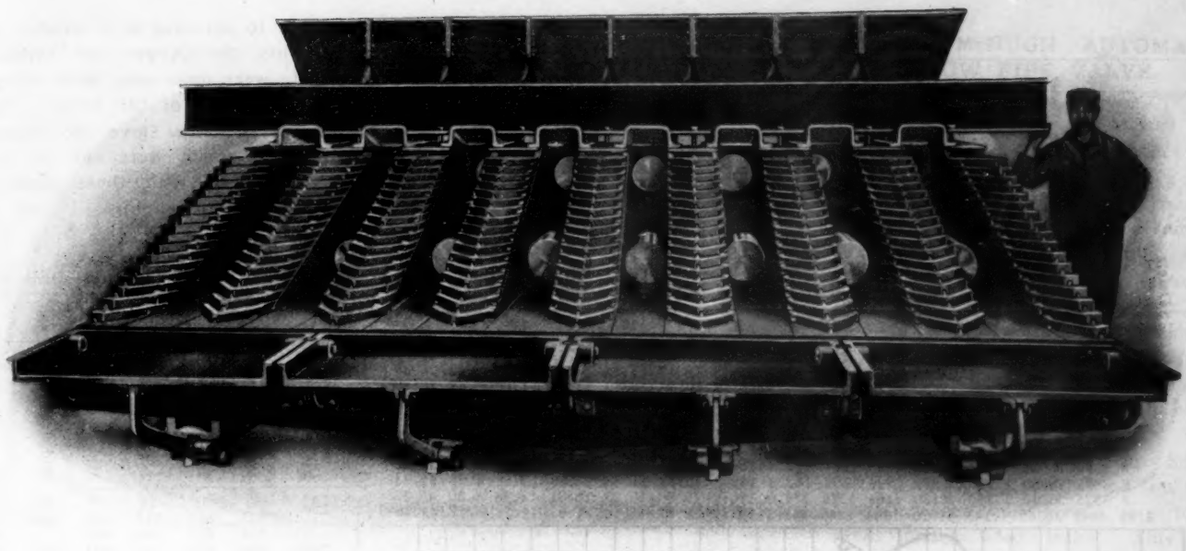


FIG. 1—FRONT VIEW OF TAYLOR AUTOMATIC STOKER.

ed, the gases passing through the boiler being at a maximum temperature and entirely free from smoke. The bed of coke and green coal moves down by gravity, being somewhat assisted by the motion of the lower row of rams, and finally the ashes pass out on to a dumping plate by means of which they are thrown to the ash pit at intervals when a sufficient amount is accumulated.

An improvement which has been made in the later stokers consists in giving the lower ram a slightly increased and quicker motion at the interval immediately succeeding dumping, in order to ring the fuel bed into a condition of maximum operating efficiency again and prevent air escaping through the tuyeres into the boilers without passing through the fire.

These stokers have been installed under 12 boilers, each of a capacity of 600 horsepower at the Waterside plant of the New York Edison Co. in New York. The conditions under which this installation operated were very severe, the overload on the boilers at times of the peak load being from 50 to 75 per cent. The stokers were able to carry this load successfully and without any trace of smoke from the chimney, operating all the while at a maximum efficiency. The percentage of carbon-dioxide in the flue gases at all times was high, run-

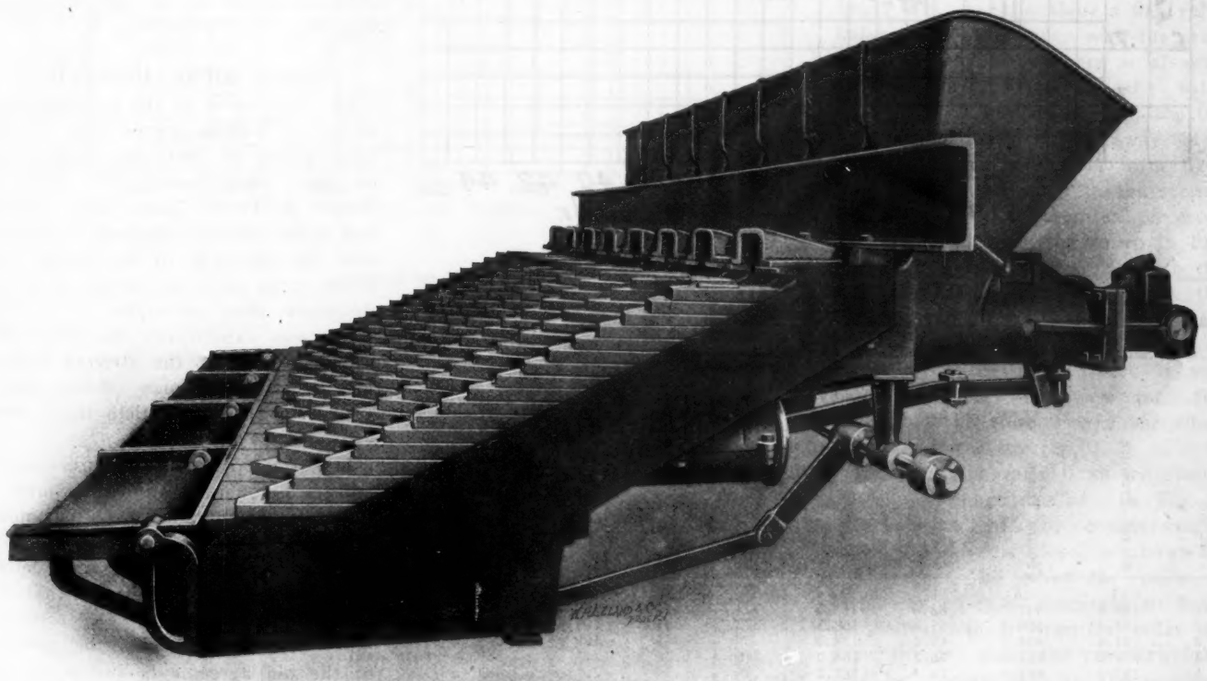


FIG. 2—SIDE VIEW OF TAYLOR AUTOMATIC STOKER.

TABLE No. 1.
ECONOMY, ETC.

Test No.	Date.	Duration Hr.	Wet Coal Fired Per Hr.—Lbs.	Actual Water Per Hr.—Lbs.	Factor of Evap. Corr. for Superheat.	Equiv. Water Lbs. per Hr.	Horse-Power. Total Test.	Horse-Power. Maximum Hr.	Per Cent Rating. Total Test.	Per Cent Rating. Max. Hr.	Actual Water Per Lb. Dry Coal.	Equiv. Water Per Lb. Dry Coal.	Equiv. Water Per Lb. Comb. Fired.	Equiv. Water Per Lb. Comb. Burned.	Equiv. Water Per Sq. Ft. H. S. per Hr.	Dry Coal Fired Per Sq. Ft. G. S. per Hr.
	1907	1	2	3	4	5	6	7	8		9	10	11	12	13	14
1	8	2230	19870	1.141	22690	658	728	101.2	112.0		9.23	10.54	11.38	11.79	3.55	25.39
2	8	2275	21000	1.137	23880	692	740	106.5	113.9		9.62	10.94	11.63	11.83	3.74	25.75
3	8	2300	22780	1.154	26300	762	818	117.3	125.8		10.19	11.76	12.60	12.72	4.12	26.38
4	8	2475	24730	1.149	28420	824	987	126.7	151.9		10.27	11.80	12.94	13.16	4.45	28.39
5	8	2500	25040	1.151	28820	836	1022	128.6	157.2		10.24	11.79	12.75	12.94	4.52	28.85
6	8	2650	25530	1.152	29410	852	1001	131.0	154.0		9.92	11.42	12.28	12.54	4.61	30.38
7	8	2625	25300	1.163	29410	852	917	131.0	141.1		9.93	11.54	12.31	12.38	4.61	30.06
8	8	2600	26100	1.135	29620	859	912	132.1	140.3		10.35	11.75	12.69	13.04	4.65	29.75
9	8	2779	26930	1.144	30800	893	1069	137.4	164.5		10.05	11.49	12.37	12.76	4.82	31.63
10	8	2825	28080	1.135	31870	924	1094	142.2	168.3		10.24	11.63	12.40	12.59	4.99	32.33
11	8	3825	35230	1.140	40180	1164	1279	179.0	196.9		9.59	10.93	11.81	12.28	6.30	43.35
12	3.85	3848	36360	1.143	41520	1204	1246	185.3	191.7		9.77	11.16	11.93	12.21	6.51	43.88

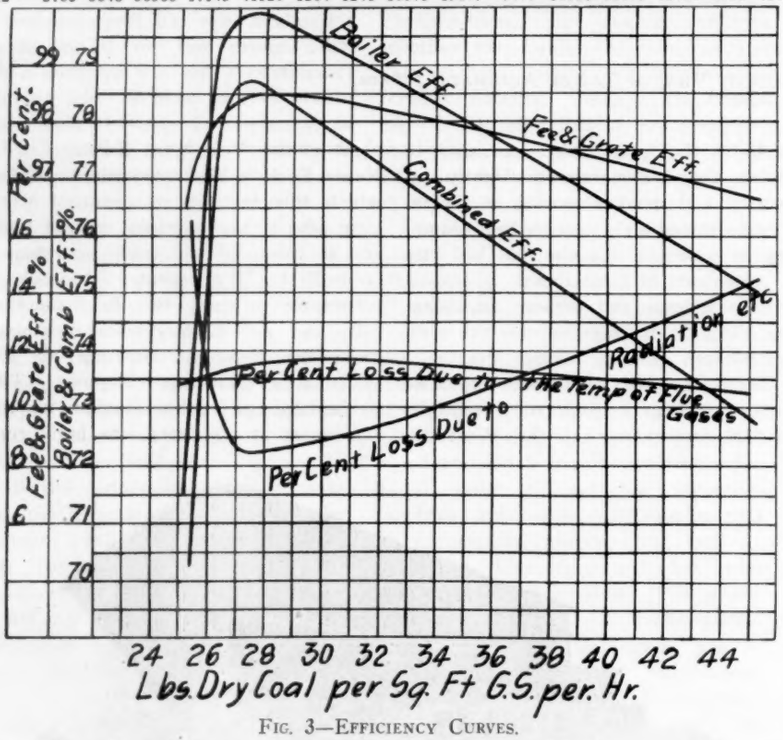


FIG. 3—EFFICIENCY CURVES.

TABLE No. 2.
CONDITIONS.

Test No.	Steam Pressure.	Steam Temp.	Superheat—Deg. F.	Feed Water Temp.	Ins. Water. Furnace Draft.	Flue Draft.	Ash Pit Pressure.	Total Draft on Fire.	Boiler Room Temp.
	15	16	17	18	19	20	21	22	23
1	189.9	447.1	63.6	165.6	.23	.34	1.9	2.13	81.9
2	193.3	450.3	65.4	168.5	.22	.33	1.9	2.12	101.5
3	193.4	454.0	69.1	154.0	.39	.55	1.9	2.29	95.7
4	194.0	461.5	76.3	164.0	.46	.70	2.1	2.56	90.6
5	193.7	461.5	76.4	161.2	.38	.59	2.1	2.48	97.0
6	191.7	462.0	77.7	158.5	.39	.62	2.1	2.49	84.2
7	195.3	463.3	77.6	150.0	.45	.69	2.0	2.45	84.2
8	192.3	451.8	67.3	171.9	.31	.50	2.1	2.41	103.5
9	196.0	466.9	80.9	171.0	.37	.64	2.2	2.57	73.2
10	194.1	451.8	66.7	172.8	.37	.54	2.2	2.57	80.0
11	195.0	466.7	81.1	176.6	.23	.53	2.9	3.13	103.5
12	193.2	466.7	81.8	172.0	.35	.63	2.9	3.25	80.0

ning over 16 per cent in a number of cases, while the oxygen and carbon-monoxide were quite low, there oftentimes being none of the latter. The accompanying tables give the results of 12 tests, which were run on the boilers equipped with these stokers, and the corrections, Figs. 1 and 2,

TABLE No. 5.
TEMPERATURE OF GASES THROUGHOUT THE BOILER—DEG. F.

Test No.	Optical Pyr. Furnace Temp.	Electrical Pyrometers. Mid. 1st Pass.	Top 1st Pass.	Top 2nd Pass.	Mid. 2nd Pass.	Mid. 3rd Pass.	Flue.
	51	52	53	54	55	56	57
1	....	833	615	519	485	428	418
2	....	852	632	524	490	...	441
3	2336	866	655	619	511	471	455
4	....	893	689	646	526	485	473
5	2420	888	681	633	521	481	468
6	2455	889	682	642	519	479	468
7	2430	913	694	655	512	486	473
8	....	896	679	...	516	...	459
9	....	956	723	660	547	512	492
10	....	939	700	634	523	493	475
11	2640	995	742	...	550	...	488
12	2530	1051	751	700	578	541	519

were constructed from the result of these tests to show the relation of efficiency to the various operating conditions. It is proper to state that these stokers run 24 hours per day with practically no shut downs for repairs or readjustment. The repair cost in year's run has been very low, being under 2 per cent of the installation cost of the machine. This stoker is manufactured by the American Ship Windlass Co., Providence, R. I.

OPEN SHOP UPHELD.

The conclusion of the boilermakers' strike at Buffalo leaves one of the large plants of that city entirely on an open shop basis. The firm of Farrar & Trefts, plate, tank, engine and boiler makers, declined to recognize the demands of the union and found it to their advantage to stand for open shop principles. No difficulty was experienced in filling the vacancies left by the striking boilermakers, as more men offered themselves for the places than there were vacancies to fill.

It was not a strike for higher wages but for union recognition, the men in some of the Buffalo shops becoming dissatisfied with certain shop rules. The old agreement called for a minimum wage scale of 34 cents an hour, and a nine-hour day. The principal point of contention was the renewal of the old agreements and when the union representatives demanded the renewal, the manufacturers refused, although a number of them have since signed.

TABLE No. 3.

COAL REFUSE AND GAS.

Test No.	Moisture.	V. M.	F. C.	Ash.	B.T.U. Per Lb. Dry Coal.	Per Cent Combustible In Refuse Thro. Grates.	Total Refuse Per Cent Wet Coal.	CO^2	O.	CO
	24	25	26	27	28	29	30	31	32	33
1	3.4	20.0	69.4	7.2	14484	29.5	10.2	10.9	7.9	0
2	4.0	19.6	70.6	5.8	14537	21.0	7.3	12.1	6.85	0
3	2.8	19.4	71.4	6.4	14516	12.8	7.3	13.3	5.9	0
4	2.7	19.9	68.9	8.5	14360	14.7	10.0	12.2	7.5	0
5	2.2	18.8	71.6	7.4	14291	14.9	8.7	13.0	6.2	0
6	2.8	18.5	71.9	6.8	14329	21.4	8.6	12.7	6.5	0
7	2.9	19.1	72.0	6.0	14820	9.8	6.7	13.5	5.8	0
8	3.0	20.8	69.0	7.2	14480	25.4	9.7	12.9	6.1	0
9	3.5	19.8	69.8	6.9	14329	27.9	9.6	13.5	4.7	0
10	3.0	19.9	71.1	6.0	14702	17.7	7.3	16.2	1.4	5
11	3.9	20.8	68.1	7.2	14360	32.2	10.6	14.1	4.4	0
12	3.2	19.9	70.7	6.2	14858	26.1	8.4	16.5	1.3	2

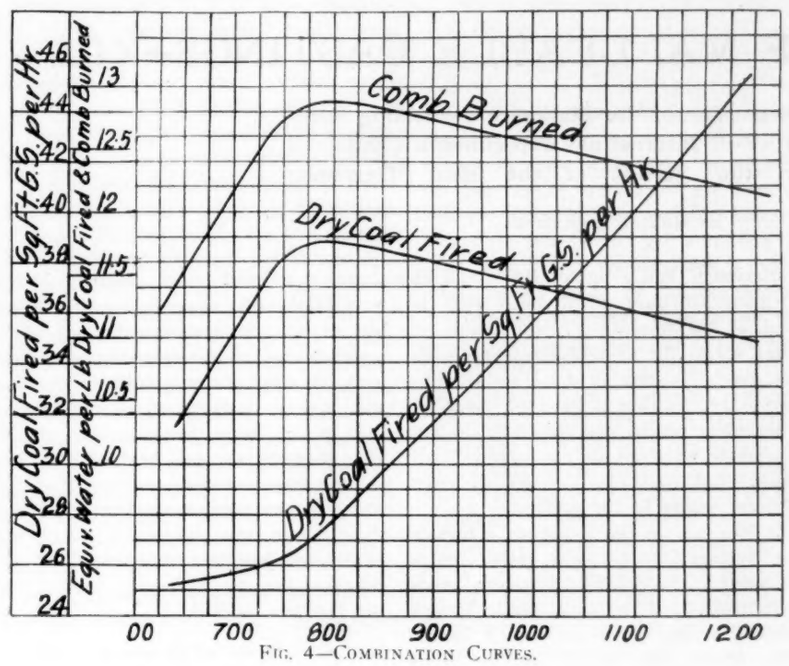


FIG. 4—COMBINATION CURVES.

TABLE No. 4.

HEAT BALANCE.

B.T.U. PER LB. COMBUSTIBLE BURNED.

Test No.	B.T.U. Per Lb. Combustible.	Absorbed in Evap. Water in Boiler.	Absorbed in Superheating Steam.	Total Absorbed in Superheating and Evap.	Absorbed in Evap. Moisture in Coal.	Loss Due to Temp. of Flue Gases.	Loss through Grates with Ash.	Loss Due to Radiation, etc.	Total Delivered to Boiler.	Boiler Efficiency. (37÷42).	Furnace and Grate. Eff. 42 / 42 + 40	Combined Eff. (48×44).	Per Cent 37/34.	Per Cent 38/34.	Per Cent 39/34.	Per Cent 40/34.	Per Cent 41/34.
	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
1	15620	11026	354	11380	48	1916	544	2276	15572	73.1	96.7	70.6	72.9	.31	12.3	3.5	14.6
2	15470	11063	367	11430	53	1723	270	2264	15417	74.2	98.3	72.9	73.9	.34	11.1	1.7	14.6
3	15540	11864	416	12280	38	1655	161	1567	15502	79.3	99.0	78.5	79.0	.24	10.6	1.0	10.0
4	15740	12228	472	12700	38	1925	213	1077	15702	80.7	98.7	79.6	80.6	.24	12.2	1.4	6.8
5	15460	12015	465	12480	30	1756	224	1194	15430	80.9	98.6	79.8	80.6	.19	11.3	1.4	7.7
6	15410	11643	457	12100	39	1870	322	1401	15371	78.7	98.0	77.1	78.5	.25	12.1	2.2	9.1
7	15800	11503	447	11950	39	1760	114	2051	15761	75.8	99.3	75.3	75.6	.25	11.1	.7	13.0
8	15640	12162	418	12580	41	1715	439	1304	15599	80.7	97.2	78.4	80.5	.26	11.0	2.8	8.3
9	15440	11822	488	12310	50	1890	464	1190	15390	80.0	97.0	77.6	79.8	.32	12.2	3.0	7.7
10	15670	11732	398	12130	41	1470	225	2029	15629	77.6	98.6	76.5	77.5	.26	9.4	1.4	13.0
11	15520	11378	472	11850	55	1708	621	1907	15465	76.6	96.1	73.6	76.4	.35	11.0	4.0	12.3
12	15860	11308	472	11780	45	1646	392	2399	15815	74.5	97.6	72.7	74.3	.28	10.4	2.5	15.1

SHUTTS - McHUGH AUTOMATIC BLOW PIPE VALVE.

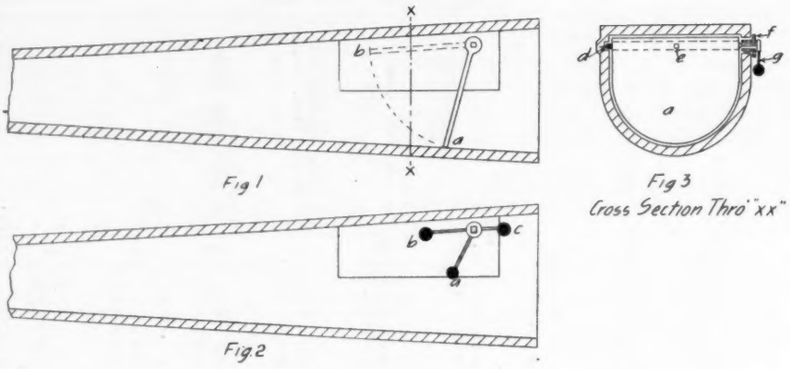
An automatic blow pipe valve for blast furnaces has been devised and patented by S. B. Shutts and William McHugh, of the blast furnace department of the Joliet works of the Illinois Steel Co., to provide a remedy for a variety of the troubles with which furnace operators must contend in connection with the irregular action of their furnaces. Particularly is this new valve offered as a preventive of the damages from slips which fill the blow pipes with coke. It becomes necessary to blow this coke out through the peep holes, causing more or less wear on the bearing faces and giving rise to a great many wind leaks. This requires that the blast be shut off and the caps changed. This valve also prevents gas from backing up into the cold blast main, thus obviating the explosions which sometimes do much damage to the cold blast system and the blowing engines. Attendant upon these preventive features is the generally increased safety for those who are working about the furnace.

The valve is located in the butt of the blow pipe and is so arranged that it closes as the blast is reduced, being counterbalanced, also closing with any back pressure from the furnace into the pipe as in the case of a heavy slip. It is in short a flap valve balanced to swing open with the pressure of the blast. There is also an arrangement for keeping the valve open when it is necessary to stop the furnace and draw the gas away. The blow pipe itself differs in form from the ordinary pipe only in the section in which the valve operates. A cross section at this point is shown in Fig. 3 indicating the manner in which the pipe is brought up square from the center to the top. This section permits of the valve when open being in the top of the pipe, where it will neither obstruct the view into the tuyere nor interfere with a bar when poking out the tuyere.

In Fig. 1 the valve is shown closed at "a" and open at "b." In Fig. 2, the position of the counterweight when the valve is closed is shown at "a" and at "b" when the valve is open. When it is necessary to have the valve remain open in order to draw the gas away the counterweight may be thrown over to the position shown at "c."

The shaft upon which the valve is carried passes through only one side of the blow pipe, being supported on

one side by an inside bearing. A leak-proof bearing has been devised for supporting the shaft where it passes through the blow pipe and no packing is required. A special device is also provided for landing the blow pipes on the floor when it is necessary to remove them from the furnace. With this device injury to the pipe or valve is entirely avoided. A valve of this description has been in service on one of the furnaces at the Joliet works for several months. The success with which the valve has withstood the severe tests of heat and abrasion from the blast and cinder is leading to the equipment of all of the Joliet stacks with this device as well as the furnaces at the South Chicago plant.



SHUTTS-MCHUGH AUTOMATIC BLOW-PIPE VALVE.

PRODUCTION OF MALLEABLE CASTINGS—XIII

A Further Discussion of the Malleable Annealing Process Together With Interesting Experiments Conducted to Ascertain the Action of the Heat Treatment

BY RICHARD MOLDENKE

Annealing the properly made hard castings is really a science, and many are the difficulties experienced where the proper means of control are not at hand. It may safely be said, however, that ten to one of the troubles encountered in annealing malleables come from improperly made hard castings, oxidized to a sufficient extent to resist heat treatment, and yet not showing this condition to the naked eye.

Let us suppose, however, that the castings were made right and have the proper composition. Then there are two ways in which the heat treatment, or annealing, as it is commonly called, may be carried out. First, a very high and short heating, and second a low and long one. The latter is the one used in this country for the production of the ordinary "black-heart" malleable, while the former is the *"ignis fatuus"* of the short-anneal inventor. With the higher temperatures, however, and longer time than even the regular American annealing process, we get the European "white-heart" malleable casting, and this is oftentimes produced here as well as when defective material is reannealed several times to make it pass muster in bending, twisting, etc., and to some extent also in the annealing of cupola work containing high sulphur.

"Black Heart" Castings.

"Black heart" malleable castings have a characteristic fracture. The core is a velvety black when the total carbon is at a maximum, and a lighter shade and of irregular structure when much steel is used in the mixture. A thin band of white forms the circumference—probably not over 1/16-inch in good work. Between the two lies a band of black of still lighter shade, corresponding to the crystalline structure of the original hard work, these particular crystals all being at right angles to the surface.

In the case of the European malleable the fracture is steely, with rather coarse structure. The material, however, bends excellently, and is very good, though slightly weaker than the "black heart." One seldom sees it this way in heavy sections, in fact when thick, it is inferior and not properly decarbonized.

A large number of annealing experiments were made in which a series of test bars were packed in scale the usual way, but enclosed in special, small, heavy boxes with iron covers, or in capped, iron pipes. Then these boxes or pipes were placed on top of selected pots with arrangements made to get them out of the oven as desired. These tests have given some clue to what goes on during the heat treatment. Normally, the process of annealing is to bring the oven up to heat as quickly as possible without exceeding the proper temperature; then to hold this maximum temperature for at least 60 hours; finally to let it drop as slowly as possible or convenient until black heat, when the pots may be drawn, allowed to cool still further, and finally dumped. In carrying out some of the above mentioned tests, enough boxes were filled with bars—all from the same part of the same first class heat of metal—and placed as far into the annealing oven as could be conveniently reached with a bar through an enlarged peep-hole in the door. Being on top of the pots, they got the full heat of the oven and naturally annealed quicker than the work in the pots themselves. One of these boxes was taken out every six hours, or four per day of 24 hours. After cooling, the bars were broken, and the fracture studied.

Color of Fracture.

It was very interesting to note how the color of the fracture became darker, shade by shade, but still held the crystalline formation intact. Then, minute spots of black appeared which, when lifted out with a fine needle under the microscope, proved to be lamp black that evidently had been separated out between the larger plates of crystalline iron. The crystalline structure then began to disappear and the carbon spots spread uniformly all over the fracture surface, but not from the edges inward, as might be expected. As the heat the bars received was greater than the pots, in a measure, the annealing to "black-heart" was completed some time ahead, and hence several bars could be taken out which had received too much heat. These showed decided "over-anneal," that is, the normal thin white edge spread inwardly, with a distinct crystalline, but entirely differ-

ent appearance than the original hard metal, and not parallel to the edges, but closing in round on the central, black core. The tests always ended with this, but others made with a specially high heat, had this white crystalline fracture which completely obliterated the black core, and the metal broke off very short. Had the process continued, without having the heat exceed a danger zone, European "white heart" castings would have been produced.

Annealing Danger Zone.

That there is such a danger zone was distinctly, and in a very expensive way demonstrated one night, when the annealer preferred the congenial atmosphere of a Pittsburg "speak-easy" to his work. The pressure of the natural gas rose suddenly and for several hours the temperature of a bank of 20 ovens went up to an unknown point. Next morning, a sadder lot of pots could not be imagined. They were wilted, tops sunken, and when finally removed and sledged apart, gave a collection of castings bristling with an enameling of scale and fractures, the crystal facets of burnt iron—dead white—being up to ¼-inch across. This, of course, is seldom seen in a malleable foundry, but shows that a high temperature and a short anneal may lead to disaster until more of the fine points are known. For this reason, all ventures based on quick annealing methods have so far uniformly failed, unless a return was made to the established process. This does not mean that we will not learn more about this subject, but until we do, it is wiser to let well enough alone.

Temperature of the Pots.

We may, therefore, confine ourselves to the two standard processes. In the case of the "black-heart," mark well the temperature of the pots in the oven—*not the oven but the pots in the oven.* They should be kept at such a temperature that when this is taken at the coldest spot on the coldest pot, in the coldest part of the oven (which is the lower part of pots in the front row, the oven being fired from the rear) it will be about 1,350 degrees, Fahr. It may be allowed to come up to 1,400 degrees for a short time if the oven is in fine condition, and as low as 1,250 degrees if the oven is rather old and the range of temperature within larger; but 1,350 degrees is the best all around heat. This, of course, refers to furnace iron, either air or open-hearth. Cupola iron temperatures should be from 150 to 250 degrees higher.

In case natural gas is used, and the supply is inadequate, some risk must naturally be taken in the matter of temperatures, and the author has found that when 1,250 degrees Fahr. has been reached in the pots as above described, and this temperature maintained for a period of 12 hours continuously, the readings could fall to 1,100 and even 1,050 degrees for a brief period at a time, and good annealing results obtained. The front, or coldest row of pots would, however, have to be watched closely, so that unannealed work might not pass through. This was simply returned again, either without disturbing the pots when it was positively known, or repacked with the new castings made. It was thus possible, in spite of difficulties arising from a short supply of gas, to get out important work for quick shipment, as the interior of the ovens was always hotter than the front.

Time Required for the Anneal.

While is is advisable to give 60 hours after full temperature has been reached, this is by no means obligatory. An ordinary heat, instead of taking six days for the cycle, can be completed in four, even with such heavy work as couplers, but the results are not of the best for safety. This helps to explain, however, why it is possible to get annealing effects with lower temperatures. Indeed, investigations made by the Smithsonian Institute on meteorites have shown that it was possible to trace the change from combined to "temper" carbon as low as 800 degrees Fahr., provided sufficient time was allowed for it to take place. All ovens will not come up to the required heat at the same time, depending upon their construction and location with reference to the stack. Thus, the smaller type with strong draft, will be up to full heat in 24 to 36 hours, while the old fashioned double oven, if large, oftentimes takes 48 to 60 hours. If no leeway were permitted in the matter of holding up to the maximum temperature, it would not be possible to operate the annealing room with clock-like precision.

Dumping the Pots.

The pots should never be dumped while red hot. The metal always suffers. All the advantage gained by holding the temperature long and cooling very slowly is thus lost, and one might as well have made it a four-day affair. The immediate result can best be explained by noting the effect of hot-straightening a piece of malleable. If a casting has to be straightened before shipment because of warping in the anneal, this should be done cold. If made red hot and hammered, the "black-heart" will disappear, and the fracture becomes a brittle and finely, crystalline white. This is especially serious if only one end of the casting has been thus treated. It will break at that point every time. For very thin casting, this, of course, does not hold, as they are usually so decarbonized, even in the "black heart" process, that they would still bend and remain fairly soft, even if they should become white again. Some very interesting effects are obtained by hardening and tempering malleable castings, and this again forms the basis of much spurious "cast steel."

The trouble is, however, that sometimes a malleable casting is so sensitive that it becomes very brittle, if not actually white, when dumped red hot from the anneal. It becomes air-quenched. It is a well known fact that ovens drawn so that the dumping of the pots takes place on Monday morning, when they are perfectly cold, always yield the softest castings; hence, strict attention should be paid to this part of annealing room practice. When the ovens are ready to have the firing cease, they are opened very slightly shortly after, so that the heat can escape. This helps to reduce the time for this operation. If, however, this is not done judiciously, that is, if strong air currents are allowed to be set up in the interior, one can plainly notice the wasting of the pots, the draft carrying myriads of tiny sparks of burnt iron outward.

"White Heart" Castings.

For making the "white-heart" malleable castings, the annealing temperature is not only higher than for "black-heart," but longer continued. It would practically correspond to our cupola iron temperatures, and instead of 60 hours maximum in anneal after up to heat, it would be more nearly 100 or even 120 hours, with the same slow cooling.

Just why there should be a difference in the temperature required for castings of the same composition when made in the cupola or in air furnace, is one of the unsolved problems. It may be chemical in that the degree of oxidation has its effect on the opening up of the structure under the influence of heat. It may, on the other hand, be a matter of molecular physics, and depend on the construction and structure of the castings as made, either in the contact of fuel with iron, or not. Possibly it may be a combination of both, the chemical and the physical. Yet the problem still remains to be solved.

Action of the Anneal.

As to the occurrences in annealing, as previously stated, the *desideratum* is the conversion of the combined to an annealing carbon, called "temper carbon," whatever may become of this afterwards. In the "black heart" but little of this "temper carbon" is removed, and it is the opinion of the author that only that por-

tion precipitated, as it were, out of the mass of iron, and lying in the band of crystalline material next to the skin which afterwards becomes gray or lighter than the centre core, is removed, and that it migrates out rather than combines with oxygen from the outside. It further migrates out faster near the skin than near the centre core. The author has invariably found that whenever oxygen did get into a casting in the anneal, through over-heating, and consequent undue opening up of the structure, or else through inability to resist penetration of oxygen by reason of too low an amount of silicon, it always gave the appearance of burnt iron. In fact it became the first part of the "white-heart" process. Unquestionably oxygen does play a part, taking out carbon by entering in the form of CO, this taking up an extra C, and passing out.

Thin Castings.

It is quite manifest that the latter process is going to be most effective in thin castings, and published tests of European iron seldom show thicker metal than ½-inch round, which means ¼-inch to put under the influence of the process, which again in turn means that if the very centre were unaffected, it would not affect the results. On the other hand, the "black-heart" process, which depends entirely upon the conversion of the combined carbon, can deal with castings several inches in thickness, provided these are cast in chills to get the metal white before annealing. The carbon removed from the skin, while acceptable, is not essential, and hence American practice, now already caring for fully 90 per cent of the world's production of malleable castings, will continue to dominate and will supplant the "white-heart" method still further.

Book for Buyers.—A new edition of "Who Makes What," a valuable book of reference for buyers, has appeared. The book includes five directories, as follows: Part 1.—Directory of the wholesale hardware houses and jobbers, United States and Canada, with the history of each establishment; Part II.—Directory of more than 10,000 manufacturers, arranged alphabetically and geographically; Part III.—Directory of products, arranged alphabetically, of more than 10,000 manufacturers—shows "Who Makes What;" Part IV.—Directory of important foreign merchants in all parts of the world furnished by, with a letter from, each American consul, direct to the publisher; Part V.—Directory of export commission houses and buyers in New York city. The publisher is Daniel T. Mallett, 253 Broadway, New York city, and the price is $1.

CHARLES T. PORTER RECEIVES JOHN FRITZ MEDAL

The John Fritz Medal, the only medal which the four national engineering societies confer, was presented to Charles T. Porter, on Tuesday, April 13. The presentation took place in the auditorium of the Engineering Societies' building, New York, before distinguished invited guests and an audience representing the entire engineering profession. The medal was conferred upon Mr. Porter for his work in advancing the knowledge of steam engineering and for improvements in engine construction. Addresses were made by Dean W. F. M. Goss, of the University of Illinois; by Prof. F. R. Hutton, of Columbia University; by Robert W. Hunt, of Chicago, and by Frank J. Sprague, New York.

The John Fritz medal was established by the professional associates of John Fritz, of Bethlehem, Pa., to perpetuate the memory of his achievements in industrial progress. Its award was placed under a board consisting of four members from each of the four national engineering societies, the American Society of Civil Engineers, the American Institute of Mining Engineers, The American Society of Mechanical Engineers, and the American Institute of Electrical Engineers.

Awards have been made to Lord Kelvin, George Westinghouse, Alexander Graham Bell and Thomas Alva Edison.

Dean W. F. M. Goss spoke of the debt of modern civilization to the steam engine. Dreams of the possibilities of steam belong to the day of Addison, Steele, Swift and Defoe, when there were no means of doing industrial work. There were no large factories in England because there was no way by which their machinery could be driven. Mines were abandoned because they were flooded with water. The movement of merchandise by land was laborious and traveling by sea slow and dangerous.

Into these conditions came the steam engine. It first freed the mines of England from water, revived dormant industries, introduced new systems of manufacture, supplied power, water and effective means of sanitation to cities, supplemented in later years by electric transmission for lighting, power and transportation. Steam replaced wind in the propulsion of ships and through the agency of the locomotive has carried civilization to the furthest ends of the earth. These achievements are direct contributions to the upbuilding of our modern civilization, the key-note of which is service.

Prof. F. R. Hutton spoke in detail of the debt which the reciprocating steam engines owes to the pioneer work of Mr. Porter. This debt may be grouped under five heads, as follow:

The reciprocating engine owes to him the first vision of the advantages that come from making the crank shaft turn at a high speed, whereby the weight of the motor per horsepower is reduced. From this thought has sprung the modern design of the motor for the self-propelled vehicle and for the aeroplane. The high speed involved the solution of difficult problems, owing to the necessity for starting and stopping heavy parts of the mechanism in each revolution. The second debt is for Mr. Porter's recognition of these problems. The third debt, perhaps the most important of all, is that the standard of mechanical construction in the high-speed engine must be of the highest type. Many manufacturing details which are commonplaces of modern practice are due to Mr. Porter. He created a form of engine condenser to be attached directly to the engine and operated at a much higher rate of speed than the ordinary pump could be used. He also invented a sensitive steam engine governor in two forms.

Prof. Hutton's address closed with a tribute to Prof. Chas. B. Richards, associated with Mr. Porter's early work of designing and John F. Allen, who had conceived many details of the first high-speed engine which Mr. Porter combined into a harmonious whole.

Robert W. Hunt of Chicago, speaking on the debt of the era of steel to the high speed engine, said that it was scarcely conceivable that one could have witnessed in a single life time the remarkable development in the steel industry which he had observed since the birth of the Bessemer processes. These accomplishments were made possible practically by the application of a more rapid power. The early processes were deliberate because man was habituated to slow movements. The first power came from the slow-turning water wheel, later from the slow-speed

steam engine. Faster movements were obtained through gears and belts. Among the first engineers to attach the rolling mill engine direct to its train of rolls were John and George Fritz, but the speed of their short strokes was limited. Charles T. Porter was the first one to give the rolling mill engineer a controllable, direct-connected, economical, high-speed engine.

Mr. Hunt referred to two engines in a rolling mill plant in Troy, N. Y., in 1876. One set of rolls was driven by a walking beam low-pressure engine, taken from the steamboat Swallow, a Hudson river boat, and the other set was driven by Porter-Allen engines. The contrast between the steamboat engine with a slow speed of 35 or 40 revolutions per minute, and Mr. Porter's little engines, running at high speed, and accomplishing much greater results, was an educational sight.

Frank J. Sprague, of New York, spoke of electricity's debt to Mr. Porter. He recalled that in 1867, at the French exhibition Mr. Porter installed two Porter-Allen engines, the only high-speed engines exhibited. In the dozen years following Mr. Porter built many engines with certain common characteristics such as high piston speed and revolutions, solid engine bed and babbitted bearings but there was no electric driving until a contract for engines for Philadelphia was made. In 1880 Mr. Porter installed a high-speed engine for Mr. Edison in his laboratory at Menlo Park and shortly after Mr. Porter was invited to construct for the Edison station in Pearl street, New York, the first of a series of engines for so-called steam dynamos each independently driven by a direct-coupled engine.

Mr. Sprague described the relations of electricity and the high speed engine not as debtor and creditor but rather a close partnership, an industrial marriage, one of the most important in the engineering world, that of prime mover and the electric generator. Here were two machines, destined to be joined together, economizing space, increasing economy, augmenting capacity, reducing investment, increasing dividends—and in this development, every advantage had to be taken of the possibilities of each. Primarily, and largely due to Mr. Porter, the high-speed possibilities of the engine were commercially demonstrated and all honor must be paid and credit given to the man who first blazed the way for the present possibilities.

ELECTRICALLY OPERATED BRAKES FOR INDUSTRIAL PURPOSES[1]

By H. A. Steen.

Abstract of paper.[2]

The paper treats of the theory, design and operation of electrically released industrial brakes. After a general introduction of the subject, the various classes of electro-responsive devices, both A. C. and D. C., are taken up and curves are shown. Formulae are given for the kinetic energy consumed by brakes, for the number of revolutions and time required for stopping, for the heat generated and the temperature rise due to the operation of brakes. The relative merits of various friction materials are discussed and the results of tests given. Several different types of brakes are critically examined and formulae and curves given. Twenty-five illustrations are shown.

Discussion.

H. D. James—After going over a paper the length of Mr. Steen's, which includes so much material, there is very little to be added in the way of special information, and I will attempt only to point out a few of the fundamental principles that underlie friction brakes. I believe these principles are applicable to brakes on railway trains as well as to brakes for stopping revolving machinery. In dealing with a brake of this character we should treat it as an engine transforming energy in the same way that we discuss the steam engine or electric motor. Let us consider a steam engine; the first question we ask is: "How does it perform its function of transforming the heat energy of the steam into kinetic energy?" In dealing with brakes we have about the reverse cycle. The brake changes kinetic energy into heat. The measure of the work done by the brake is the actual amount of heat absorbed and dissipated. We have the energy accelerating the machinery stored up in the moving parts of the machinery. When we bring those parts to rest we must change the kinetic energy into heat. The heat passes into the brake and is transmitted by the brake into the surrounding atmosphere. So that the work done by the brake is the transforming of one form of energy to another.

The next point is the adaptability of a brake to absorb this energy and transform it into heat and to dissipate it. The brake should have considerable specific absorption capacity, if we can call it that. The materials of which it is made must be capable of absorbing considerable energy if it is to be used as a stop brake so that the energy may be stored in a short time, probably two or three seconds, dissipating it in a longer period by radiation. If the brake, however, is used for retarding a falling body the energy is stored in the brake through a considerable period of time, and its absorbing capacity is not the principal function, but rather its ability to radiate heat continuously. So that when examining a brake from the standpoint of design we must first consider what the brake is to be used for.

The third function of a brake has still more to do with the details of design; namely it must be of such form or design that in converting kinetic into heat energy it is not destroyed. The friction materials must be as indestructible as can be secured for the purpose. They also must be well adapted for the absorption and radiation of heat. If any substance of an organic nature is used, the specific heat is very low and the mass is small, so that the storage capacity of such material is very limited. Most organic substances do not radiate and are not conductors of heat, with the result that they retard rather than assist the radiation of heat. Another difficulty with the organic substance seems to be its inability to withstand high temperatures. None of us would think of using organic materials for the friction surfaces of a brake on a railroad car as we know they will not last. Those friction materials should be used which will not be injured by heat and which are cheap, as the service wears them out and we throw them away.

Another point to consider in a brake used for certain classes of industrial apparatus in shops, is that the retarding effort of the brake, the torque, will remain as nearly constant as consistent with the conditions of the design and the application. If the friction surfaces of a brake are run in oil the co-efficient of friction remains very constant. We all know the Weston disc brake. If, however, it is not desirable to have so

[1] A paper read before the Engineers' Society of Western Pennsylvania, Oct. 20, 1908.

[2] Printed in The Iron Trade Review of Dec. 24, 1908.

complicated a piece of apparatus, the question is: What material can be used that will give a comparative degree of uniformity in friction? In my experience a metal comes nearer this than any other substance. An organic substance changes its co-efficient of friction rapidly if it is subject to severe heat. If it is worked with a lubricant the amount of lubricant on its surfaces determines its co-efficient of friction. Grit, dust and dirt interfere with this uniformity. If, however, a metallic substance is used and worked at a temperature which will vaporize any grease, oil or water that may accidentally get on the surface the co-efficient of friction will remain fairly uniform. It probably will not vary over 25 per cent.

In general, I believe these are the underlying principles in the selection of a friction brake. This, however, does not take into account special applications. For instance, there are places where lubricated leather will be the proper thing. These are but special applications of the general idea. In working upon this subject they have been the general principles that I have tried to bear in mind in applying friction surfaces for various purposes.

H. W. Stevenson—I have had considerable experience with disc type brakes. They formerly were designed with wooden plugs inserted in an iron disc which revolved against stationary bronze. I found that the surface was not great enough to absorb the kinetic energy as quickly as required and I redesigned the brake making both bronze and iron discs solid, still maintaining the iron as the revolving disc. I noticed in Mr. Steen's paper the revolving disc was bronze and I wanted to know if there was any difference whether the bronze or the iron revolved.

The Author—The breaking action will be the same with either the bronze or iron discs rotating. The rotating discs are usually bronze as they are smaller than the stationary discs and reasons of economy lead to the use of the more expensive metal in the lighter, rotating parts; further the bronze being the stronger metal it is better adapted to withstand the high stresses which occur in the rotating plates at the shaft.

E. K. Hiles—During the preparation of Mr. Steen's paper for publication a number of questions came up which were discussed with the author at that time, and I am going to ask him to answer a few of them again here.

On page 1064[1] the statement is made that the coefficient of friction of cast iron is dependent upon the speed. How does this condition influence the braking characteristics?

How do the shoe brakes, shown in Fig. 5, stand up under heavy continuous service, as regards their wearing qualities and their characteristics as to uniformity in action?

Referring to the curve of unit retarding moment in the latter part of the paper on page 1064, one observes that the retarding force increases rapidly

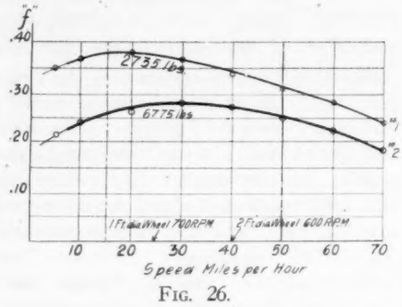


FIG. 26.

with the co-efficient of friction, and it is, therefore, important to keep the co-efficient of friction as uniform as possible to obtain uniform action in the brake. I want to ask Mr. Steen his opinion as to the influence of this feature, and how the new band brake, shown in Figs. 19 and 20, compares with the older types, such as that shown in Fig. 16?

The Author—The results of tests made at Purdue University by Prof. R. A. Smart,* which are mentioned in my paper on pages 395 and 396, are

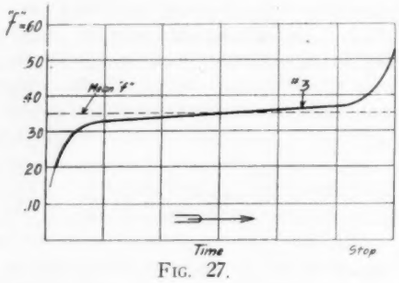


FIG. 27.

shown in Figs. 26 and 27. The brakes used in these tests were fitted with cast iron shoes the wheels carrying steel tires. The brakes shown in Fig. 5 to 8 and Fig. 18 to 20, are equipped with cast iron shoes and wheels. Therefore the results of the tests above referred to are not directly applicable to these brakes, but form, however, a fair basis for comparison, indicating the change of the coefficient of friction under different conditions of speed and pressure. The speeds, up to 70 miles per hour, are the peripheral speeds of the wheel at the instant of applying the brake. The coefficient of friction given is the mean during one stopping period.

Curve No. 1, Fig. 26, is for a shoe pressure of 2,735 pounds, and curve No. 2 for 6,775 pounds. Curve No. 1 approaches most nearly the conditions met with in industrial brakes. The peripheral speed varies from 15 to 50 miles per hour for these brakes and it can be seen from the curves that the mean co-efficient of friction "*f*" maintains a high value between these limits. The variation of "*f*" (or the retarding torque) during one stopping period varies approximately as shown in curve No. 3, Fig. 27.

The torque rises rapidly after the application of the brake until a certain point is reached, after which the increase is more gradual. When the wheel slows down toward the end of the braking period the torque rises to approximately 1½ times the mean torque. This means that the brake shoes grip the wheel, when applied, without much of shock. When stopping, a tight gripping takes place, and the static torque of the brake is much larger than the mean torque of a braking period.

As to the wearing qualities of shoe brakes shown in Fig. 5 to 8, I will refer to one case where a 75-horsepower brake of this type was used for the screwdown of a 35-inch blooming mill, a very hard service indeed.

After four months of continuous operation the shoes and wheel showed very little wear, and all parts were in perfect condition. In this case very quick and accurate action of the brake was necessary for adjusting the rolls and the clearance between wheel and shoes was, therefore, adjusted to 1-50 inch approximately, making the necessary travel of the magnet core only ½ inch, effecting a quick action of the magnet plunger.

The new band brake, Fig. 18 to 20, has soft cast iron friction surfaces, a radical departure in band brakes. The brake is not lubricated. No appreciable change in the structure of the surfaces or of the cofficient of friction "*f*" takes place if the right pressure is applied. Oil or water which might accidentally appear, would be rapidly burned off.

(To be continued.)

Investigations conducted at the fuel testing plant of the United States geological survey at Denver, during 1908, into the washing and coking of the coals of the Rocky Mountain region, have just been reported upon by the survey. Of the 37 coals tested from this region all but three produced good coke under proper treatment, although a number of them had been considered non-coking.

[1]See THE IRON TRADE REVIEW.

Reactionary Tendency in Stocks.

The stock market in the main during the past week showed some reactionary tendencies, the principal attention of traders being devoted to the lower priced stocks which have been inactive for some time. The political disturbances of Turkey seem to have had a bearish tendency for a portion of the week. However, some stocks advanced materially, particularly Pullman, which gained 11¼ points on the strength of the receipt of increase of orders, and the announcement that the plant is running to 80 per cent of capacity. Monday's opening was inactive, the average prices advancing to the highest of the year. Less activity marked Tuesday's market, and prices closed somewhat lower. There was some irregularity on Wednesday, with reactionary tendencies, but certain railroad stocks at the close displayed much strength. The copper market was reported steady and unchanged, but with stocks considered somewhat heavy. On Thursday, attention was diverted somewhat to the wheat market, in which new high prices were scored. Cotton also advanced, but the general stock market itself was reactionary. Possibly in sympathy with the depression in the foreign markets, caused by the developments in Turkey, a reaction more or less short occurred Friday. Gold to the amount of $81,000,000 was engaged for export to Brazil this week. Saturday's opening was weak, but closed firm and higher. Call loans ranged from 1½ to 2½ per cent, but time loans were easy throughout the week. The failure of what was popularly considered a large "wire" house in New York, during the early part of the week, seemed to have only extremely local significance.

Bank clearings throughout the United States increased 10 per cent over the preceding week, and showed a gain of 42 per cent over the corresponding week last year. Another record total was shown for the week in immigration arriving at New York. Net earnings for the railroads for February report an increase of over $11,000,000, or 32 per cent, compared with the corresponding month last year. The total surplus of clearing house banks was reported at $11,791,075, compared with $60,866,375 a year ago. The actual condition of clearing house banks was reported as follows: Loans increased $11,241,400; deposits increased $13,103,600. Reserve increased $2,649,900, and the percentage of reserve 25.70, a decrease of 0.05. Nonmember banks and trust companies reported loans increased $12,877,000. Net deposits increased $11,280,500, and the percentage of reserve 19.2, a decrease of 0.3.

Shares were dealt in during the week to the amount of 4,777,702, compared with 3,454,770 the preceding week, and 1,167,400 the corresponding week last year. Bonds, exclusive of government bonds, were sold to the amount of $31,815,000, compared with $34,252,000 the preceding week and $12,530,000 the corresponding week last year.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quo. Apr. 17	Changes in Week	Date 1909 Ann.	M't'g.	Stock Outstanding	Basis	Dividend Last Declared	Dividend Date Last Div. Pay.
Allis-Chalmers	15⅛	+ ⅛	Sept.	2	$19,820,000		.....	.....
Allis-Chalmers pr	47¾	+ ¼			16,150,000	7 cum	1¾ Q.	Feb., 1904
American Can	9⅛	+ ⅛	Feb.	2	41,233,300		.....	.....
Am. Can pr	76½	+2			41,233,300	7 cum	1¾ Q.	Jan., 1909
Am. Car & Foundry	49¼	— ½	June	24	30,000,000		½ Q.	Jan., 1909
Am. Car & Fdy pr	111½	+ ⅜			30,000,000	7 n. c.	1¾ Q.	Jan., 1909
American Loc.	54¼	— ⅝	Oct.	19	25,000,000	5	1¼ Q.	Aug., 1908
American Loc. pr	114½	— ⅜			25,000,000	7 cum	1¾ Q.	Jan., 1909
American Ship	55⅜	—3½	Oct.	13	7,600,000	4	1 Q.	June, 1908
American Ship pr	105	+1¼			7,900,000	7 n. c.	1¾ Q.	Oct., 1908
Am. Steel Foundries(new)	37½	— ¾	Dec.	2	17,184,000		.....	.....
Am. Steel Foundries, pr	47½	.....			17,240,000	6 cum	1	Aug., 1904
Barney & Smith	40	.....	June	1	2,000,000	4	1 Q.	Sept., 1907
Barney & Smith, pr	95	.....			2,500,000	8 cum	2 Q.	June, 1908
Bethlehem Steel	22¾	— ¼	April	6	14,862,000		.....	.....
Bethlehem Steel, pr	50	—1			14,908,000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	35¾	— ¼	March	16	45,000,000*	6	1½ S. A.	Feb., 1909
Cambria Iron	46½	— ¼			8,468,000*	4	2 S. A.	Sept., 1908
Chicago Pneumatic Tool	23	.....	Feb.	15	6,145,800	4	1 Q.	Oct., 1907
Colorado Fuel	37½	—1¾	Oct.	18	34,235,500		3½	April, 1902
Crucible Steel	7¼	+ ¼	Oct.	20	24,578,400		.....	.....
Crucible Steel, pr	59⅝	+ ⅜			24,436,500	7 cum	1 Q.	Mar., 1909
Empire Steel	7	+1	April	27	1,254,770		.....	.....
Empire Steel, pr	47	+1			2,500,000	6 cum	1½ S. A.	Jan., 1909
Fay & Egan	90	.....	Feb.	18	1,000,000	6	1¼ Q.	Nov., 1908
Fay & Egan, pr	125	.....			1,000,000	7 cum	1¾ Q.	Nov., 1908
General Electric	156	—3½	May	11	65,178,800	8	2 Q.	Jan., 1909
Harbison-Walker	17	.....	Jan.	18	18,000,000		½	Oct., 1907
Harbison-Walker, pr	80	— ⅛			9,600,000	6 cum	1½ Q.	Jan., 1909
International Pump	38½	—1¼	June	8	17,762,500		1	April, 1905
International Pump, pr	86	+ ½			11,350,000	6 cum	1½ Q.	Feb., 1909
Lackawanna Steel	32	+2	March	10	34,971,400		.....	.....
Lake Sup. Corp.	26¾	+3⅛	Oct.	6	40,000,000		.....	.....
New York Air Brake	87	—1	June	17	8,012,500	8	2 Q.	Oct., 1907
Niles-Bement-Pond	100	.....	Feb.	3	8,500,000	6	1½ Q.	Mar., 1909
Niles-Bement-Pond, pr	100	.....			2,000,000	6 cum	1½ Q.	Feb., 1909
Otis Elevator Co.	47	.....	March	15	6,375,300		1½ S. A.	April, 1909
Otis Elevator Co., pr	96	.....			6,295,000	6 n. c.	1½ Q.	April, 1909
Penn. Steel	50	.....	May	10	10,750,000		.....	.....
Penn. Steel, pr	105¼	+1			16,500,000	7 n. c.	3½ S. A.	Nov., 1908
Pittsburg Coal Co.	10½	+ ¼	March	9	28,104,600		.....	Nov., 1906
Pittsburg Coal Co., pr	42	— ½			27,071,800	7 c.	1¾	April, 1905
Pressed Steel Car	37	— ¾	Feb.	17	12,500,000		3	Aug., 1904
Pressed Steel Car, pr	99	+ ½			12,500,000	7 n. c.	1¾ Q.	Feb., 1909
Pullman	188	+11¼	Nov.	10	100,000,000	8	2 Q.	Feb., 1909
Railway Stl. Spring	39	—1	March	4	13,500,000	4	1 S. A.	Oct., 1908
Railway Stl. Spring, pr	99½	— ½			13,500,000	7 cum	1¾ Q.	Dec., 1908
Rep. Iron & Steel	22⅝	.....	Oct.	20	27,191,000		.....	.....
Rep. Iron & Steel, pr	74⅛	— ⅛			20,416,900	7 cum	1¾ Q.	April, 1908
Sloss-Sheffield	75	+1¾	March	10	10,000,000	5	1¼ Q.	Mar., 1909
Sloss-Sheffield, pr	108	.....			6,700,000	7 n. c.	1¾ Q.	April, 1909
U. S. Pipe & Fdy	31	+ ¾	June	23	12,500,000	4	1 Q.	Dec., 1907
U. S. Pipe & Fdy., pr	74¼	— ¼			12,500,000	7 n. c.	1¾ Q.	Sept., 1908
U. S. Steel	50¾	— ⅛	April	19	508,302,500	2 n. c.	½ Q.	Mar., 1909
U. S. Steel, pr	114½	— ⅜			360,281,100	7 cum	1¾ Q.	Mar., 1909
U. S. Steel 5s	103⅜	+ ¼			463,798,000	5	5 A.	.....
Va. Iron, Coal & Coke	60	.....	Sept.	21	9 073,680		.....	.....
Westinghouse Elec	81	—2	June	16	27,173,200	10	2½ Q.	Oct., 1907
Westinghouse Air Brake	108	—2	Oct.	5	14,000,000*		2½ Q.	April, 1909

Par value of shares, $100, except those starred (*), $50.

Copper Stocks.

New York.—Amalgamated copper closed 74¾, a net loss of 2½.

Boston. — Butte Coalition closed 24¼, a net loss of ¾; Calumet & Arizona closed 100½, a net loss of ½; Calumet & Hecla closed 605, a net loss of 20; North Butte Mining closed 67½, a net loss of 5; Quincy Mining closed 88, a net loss of ½.

Financial Notes.

The Pennsylvania Steel Co. declared the semi-annual dividend of 3½ per cent on preferred stock, payable May 1; the Amalgamated Copper Co., the usual quarterly dividend of one-half of 1 per cent, payable May 31; the Henry R. Worthington Co., Inc., the regular semi-annual dividend of 3½ per cent, payable May 1.

NEWS FROM MANY INDUSTRIES

New Buyers:—

The Johnston-Adams Switch Devices Co., Columbus, O., has been incorporated with $100,000 capital stock by S. A. Johnson, C. B. Adams, G. B. Butten, J. A. Kidwell and T. J. Moore.

The Trenkamp Stove & Mfg. Co., Cleveland, has been incorporated with $75,000 capital stock by H. J. Trenkamp, Henry Trenkamp Jr., B. A. Guerink, L. H. Guerink and W. L. Carr.

The Climax Railway Supply Co., Canton, O., has been authorized to do business with $25,000 capital stock. The incorporators are H. B. Stewart, F. W. Stewart, William Simpson, Jay Taylor and Allan R. Simpson.

A charter has been granted to the Magnetic Locomotive Co., Marquette building, Chicago, to manufacture electrical devices and machinery, with $100,000 capital stock. The incorporators are Frank B. Tinker, Ward S. Perry and John R. Merkle.

The Wizard Furnace Co., Ltd., capitalized at $100,000, has been incorporated to manufacture furnaces, stoves, etc., at Toronto, Ont., by Jay E. Denise, George G. Eakins, Charles E. Howarth, W. W. Weeks, and E. N. Jackson, who are named as provisional directors.

A charter has been granted to the Barbor Machinery Co., Boston, to manufacture and sell machinery, with a capital of $100,000. The president is Elmore E. Locke, Malden, Mass.; treasurer and clerk, Eugene C. Upton, 166 Devonshire street, Boston.

The Manganese Steel Safe & Vault Co., Plainfield, N. J., has been incorporated with $100,000 capital stock to manufacture safes and vaults. Those interested are Robert E. Jennings, Jersey City; Knox Taylor, High Bridge, N. J., and Frank H. Bucklin, Plainfield, N. J.

The Delta Electric & Mfg. Co., 1240 Monadnock block, Chicago, has filed application for a charter to manufacture electrical machinery and appliances, with an authorized capital of $5,000. Those interested are Wendell P. Slayton, Harry E. Kiester and Frank L. Belknap.

The Berg Emergency Calk Co., Brooklyn, N. Y., has been incorporated to manufacture machinery, with $100,000 capital stock. The incorporators are: Joseph Early, 218 Sterling place; A. W. Burlingame Jr., 215 Montague street, both of Brooklyn, and E. A. Munger, of Springfield, Ill.

The Diskin Mfg. Co., New York city, has applied for a charter to manufacture machinery, with $10,000 capital stock. Those interested are: Rubin Abraham, 34 Johnson avenue; Jacob Furman, 127 Dubavoy street, both of Brooklyn, N. Y., and Benjamin Kapper, 79 Cannon street, New York city.

The Positive Differential System Co., Phoenicia, N. Y., to manufacture steam heating valves, build plants for furnishing steam, hot water and hot air, etc., has been granted a certificate of incorporation, with an authorized capital of $50,000. The incorporators are: Evan L. Tamblyn, 202 Park place; Ward W. Pickard, 157 Montague street; Raphael A. Egan, 12 West 103d street, all of Brooklyn, N. Y.

New Construction:—

J. A. Burgard has broken ground for a machine shop on the Hart property at Vermont, Ill.

The Duncan Electric & Mfg. Co., Lafayette, Ind., is having plans prepared for a five-story brick and stone factory building, 30 x 132 feet, estimated to cost $16,000.

The Duluth, Missabe & Northern railroad is planning new shops for Virginia, Minn., to replace the inadequate present shops that will include both foundry and machine shops.

George S. Wilson and C. L. N. Haines, owners of the Wilson-Loy foundry and machine shop, of Aurora, Ill., are at Muskogee, Okla., arranging for the removal of their plant from Aurora.

B. McGarry & Son, of 1175 South Paulina street, Chicago, have had plans drawn for a boiler shop at 2041 South Hoyne avenue, one story, brick and steel, 50 x 60 feet, estimated to cost $5,000.

The Bettendorf Axle Co. has just let the contracts for the cranes for its new steel foundry at Davenport, Ia. The Morgan Engineering Co. was the successful bidder and the total value of the award aggregated $90,000.

E. O. Partridge has awarded the general contract for the construction of a machine shop at 818-20 West Lake street, Chicago, two stories and basement, brick, 50 x 115 feet, estimated to cost $10,000.

The Peerless Motor Car Co., of Cleveland, has filed notice of an increase in its capital from $600,000 to $3,000,000. The plant at Cleveland will be enlarged, and a new plant established in New York.

The foundations for the foundry which Joseph Rothe is building at Green Bay, Wis., have been built, and the construction of the foundry of reinforced concrete will be begun shortly.

The Architectural Iron & Wire Works, Wheeling, W. Va., has an addition to its plant in course of construction, which, with the added machinery equipment that has been purchased, will double the plant's capacity.

The Standard Steel Car Co. has awarded to B. A. Groah & Co., of Pittsburg, a contract for the construction of a four-story steel frame office and engineers' building at Butler, Pa., to cost $165,000. Work is to be started at once.

The Union Oil Tool Co. announces plans for building a machine shop to cost $50,000 in the Fullerton oil field, near Randolph, Cal., and has also begun the construction of a machine shop at Moron in the Midway field, and another at Coalinga, Cal.

The Johnson Engine Co., Sunnyvale, Cal., has resumed the construction of buildings which had been suspended. Two of the main buildings will be ready for occupancy inside of two months. Concrete floors for the machine shop, 70 x 258 feet, have been placed.

With the awarding of the contract for the building to the American Bridge Co., the construction of the proposed boiler shops of the American Locomotive Co. has been started at Dunkirk, N. Y. It is understood that pattern and tank shops will be built this year also.

The Cascaden Mfg. Co., Waterloo, Ia., whose plant was seriously damaged by fire recently, has had plans drawn for a new foundry, upon which work will be started at once. The new foundry will be on the site of the old one, will be a larger structure, and an improvement every way.

The Zenith Furnace Co. is installing an incinerating plant at its furnace at West Duluth. The ore dust from the downcomer, by this process, is mixed with limestone and burned, and the resulting material is charged as part of the furnace burden. Relining of the furnace stack is being hurried, and it will likely be blown in by May 1.

Leach & Sons Co., Ltd., Kemptville, Ont., which was recently or-

ganized as a successor to the firm of Z. Leach & Sons, founders, machinists and blacksmiths, advises that the incorporation was for the purpose of enlarging the capabilities of the business, and that especially the foundry will be added to in order to facilitate the output of stoves and ranges in line with the growing demand.

The William B. Pollock Co., Youngstown, O., is moving its blacksmith shop from the north side to the south side of the main building, when an addition of 300 feet will be made, making the remodeled building 45 x 467 feet. Six blacksmithing fires will be added, five flanging fires, three steam hammers, three hydraulic flanging machines and a full equipment of electric overhead cranes. All of the new machinery has been delivered on the ground.

The Berry Foundry & Mfg. Co., St. Joseph, Mo., machine castings and structural material, advises that the increase in capital stock does not mean extended improvements immediately, although it expects to replace some of its present equipment, making it a thoroughly modern shop before the end of the year. The company advises that it will be interested in the prices of cupolas, bolt cutters, steam hammers and cranes, both traveling cranes and jibs.

Herman J. Trenkamp, Cleveland, has organized the Trenkamp Stove & Mfg. Co., with an initial capital of $75,000. Contracts have been let for the erection of a plant on Quincy avenue S. E. Construction work will be begun at once, and it is planned to have the plant in operation by September. The main building will be 42 x 225 feet, of mill construction, and will be devoted to the manufacture of stoves and gas ranges, together with a line of gas appliances. Mr. Trenkamp was formerly secretary of the American Stove Co.

The Detroit Steel Product Co., Detroit, advises that it has increased its capital stock to $500,000, for the purpose of developing the manufacture of the wrought steel Detroit Fenestra sash (patented), and increasing its business. A new building for the manufacture of the sash has been planned and contracted for. It will be 100 x 300 feet, of brick, steel and concrete construction, with a reinforced concrete roof and Detroit Fenestra window sash. The machinery order has been placed with the E. W. Bliss Co., of Brooklyn.

E. F. Avery & Sons, Louisville, Ky., manufacturers of plows and agricultural implements, are having plans prepared for a new plant to be built in the suburbs of Louisville. The buildings will be mostly one story, and will cover a total area of more than 500,000 square feet of floor space. The general construction will be of concrete or brick, with steel trusses, and gravel roofing. An automatic sprinkler system, boilers and engines of 700 horsepower and electric boiler equipment are some of the machinery that will be installed.

General Industrial:—

The Kewaunee Iron Works Co., Kewaunee, Wis., has filed notice of dissolution of the corporation.

The Phillemac Rolling Mill Co., Glendale, O., has increased its capital stock to $70,000 from $40,000.

The Speedwell Motor Car Co., of Dayton, O., has increased its capital stock from $50,000 to $250,000.

The Safety Cylinder Valve Co., Mansfield, O., has increased its capital stock from $50,000 to $100,000.

The Nye Tool & Machine Works, Chicago, has filed official notice of its increase of capital from $25,000 to $50,000.

The Wellington Machine Co., Wellington, O., has filed notice of the reduction of its capital stock from $100,000 to $50,000.

No. 3 stack of the Haselton, O., furnace of the Republic Iron & Steel Co. was blown in April 6, putting all three of the Haselton stacks in blast.

The Central States Bridge Co., Indianapolis, with a capital of $199,400, has filed a statement to do business in Wisconsin, with interests valued at $25,000.

The Olin Gas Engine Co., Buffalo, whose plant was recently damaged, advises that only damage by water was sustained, and it will not be under the necessity of building anew.

The American Pipe & Construction Co., of Philadelphia, at its bid of $1,558,695, has been awarded the contract for the building of about six miles of the Catskill aqueduct. The work must be completed within 3½ years.

Tate, Jones & Co., Inc., have just received an order through the Erie City Iron Works from the Union Pacific railway at Omaha, Neb., for complete oil burning equipment for use in connection with Erie City "Economic" boilers.

At the annual meeting of Phelps, Dodge & Co., of New York, the following directors were elected: James Douglas, Cleveland H. Dodge, Arthur C. James, James McLean, George B. Agnew, E. Haywood Ferry, Francis L. Hines, George Notman and William Church Osborn, all of New York city.

The Northern Engineering Works, of Detroit, Mich., reports recent shipments of Newten cupolas with hourly capacities as follows: To the Quinn Wire & Iron Works, 4-ton cupola; to the Sheridan Stove Co., 12-ton; Crown Mfg. Co., 4-ton; Wagner Bros., 5-ton; Wm. Fetzer & Co., for their new plant at Springfield, Ill., one 10-ton.

The Scully Steel & Iron Co., Chicago, has leased with the right to purchase any time within 21 years for $235,000, the land which it occupies at the northwest corner of Ashland avenue and the Chicago river, 239 x 631 feet. The lease, which runs for 99 years, was signed in compliance with an agreement by the lessee upon its completion of a warehouse and office building valued at $100,000.

The Hughson Steam Specialty Co., Chicago, whose incorporation was recently noted, has been organized as successor to the John Davis Co. in the manufacture of the Eclipse steam specialties, including regulator valves, steam traps, etc., and it expects to add to its line of steam specialties from time to time. The company advises further that it will be located in its new building at 5021-23 State street, on and after May 1.

The Cadillac Machine Co., Cadillac, Mich., which was recently incorporated with $80,000 capital stock, has been re-organized by the former owners, Walter Kysor and F. L. Farrar, who have extended their holdings to James B. O'Dea and C. B. Farrar, the latter two of whom have been identified with the company. The Cadillac company is transacting an excellent volume of business in factory and mill machinery, structural work and general repairing.

President Charles A. Lyerly, of the First National bank, Chattanooga, advises respecting the recent purchase of the charcoal stack at Attalla, Ala., that it is the purpose to re-organize the Eagle Iron Co., former owner of the stack, under the name of the Eagle Furnace Co. Because of the present condition of the iron market, in all probability the furnace will not go into blast before the first of next year. It is proposed to turn out high grade charcoal iron.

Nathan Eisemann, of Brookline, Mass., holding 400 shares of preferred and 300 shares of common stock in the American Steel Foundries Co., has brought suit against the company and each of its directors to question its

right to complete the exchange of its new stock for its old in accordance with stockholders' decision in June, 1908. Most of the old stock has already been exchanged, in accordance with this plan which provides for a reduction in capitalization to $17,184,000.

The Southern Pipe & Foundry Co., Birmingham, Ala., manufacturer of soil pipe and fittings, advises relative to its increase of capital stock that it will carry a larger stock of pipe and fittings in order to make prompt and complete shipment on all orders. Its business is showing a healthy increase, and it is itself proposing to carry sufficient stock at all times to meet varied demands. At present, it does not contemplate making any changes in its plant or equipment.

The Ralston Steel Car Co., Columbus, O., has enough orders on its books to keep the plant running until July 1, among which are 500 steel underframes for the Hocking Valley railroad, for 80,000-pound gondolas; 300 steel underframes, part of an order for 1,300 steel underframes for the Erie Railroad Co.; three all-steel hopper cars for the Solvay Process Co.; 30 all-steel mine cars, for the Sterling Salt Co.; four 100,000-pound capacity all-steel cars for the Concrete Materials Co., in addition to a number of other orders placed for delivery in April and May.

The Indiana Machine Co., Columbus, Ind., general repair and boiler work, advises that it is occupying shops formerly owned by the National Machine Co., which has retired from business. Repairs have been completed, and the plant is now in active operation. In addition to a modern machine and general blacksmithing shop, the company proposes within the next three months to build a foundry to aid in the manufacture of rotary engines and sectional sash weights, both of which have been patented by C. E. Rhorer, who, with Charles T. Caldwell, are the principal stockholders.

The Keystone Steel Casting Co., Chester, Pa., which recently increased its capital stock, has undergone important changes in management. A. G. Lorenze, who had been president of the company since its organization, has tendered his resignation on account of ill health, and has been succeeded by Thomas R. Higgins, who was for several years president of the Standard Roller Bearing Co, and was also with the Ardmore Auto Co. Charles T. Fletcher, who was also with the Standard Roller Bearing Co., has been named superintendent of the Chester plant. The new managers will give special attention to the production of steel for automobile parts.

The Tandem Gas Engine Co., with works at South Houston, Tex., and Detroit, Mich., advises that the buildings, factory and equipment at South Houston have been completed and placed in operation, and for three months the plant has been making patterns, jigs and special tools for the Hicks patented tandem gas and gasoline engines, portable, stationary and marine. The company has also made and delivered $10,000 worth of these engines in the past three months, the sizes ranging from 10 to 50 horsepower. The company further advises that it is contemplating increasing its Houston plant in the future, so as to be able to supply the demand for these engines.

The Ideal Automatic Mfg. Co., 125-129 Water street, New York city, advises respecting its recent incorporation that it succeeds the Ideal Automatic Pump Governor Co, a New Jersey chartered corporation. The reason given for the re-incorporation is that the company desired to change the name to one that does not limit its business to pump governors. It is building not only the Ideal governor, but pressure control valves and regulating valves for air, gas, water, steam and oil, both bronze and cast iron, and has recently brought out several new devices, including a pressure control valve for controlling excessively high pressure. The company also manufactures a special semi-metallic packing. Since the reorganization, it has very largely increased its sales force, with gratifying results.

Trade Notes:—

DeHart & Stafford, dealers in iron and steel, will remove April 25 to new offices in the Engineering building, 114 Liberty street, New York.

The Utica Drop Forge & Tool Co., Utica, N. Y., has announced that beginning April 1 it will sell its own product directly to the trade. This company operates one of the largest nipper and plier factories in the world, having more than an acre of area under roof and with one mile of industrial railroad on their premises. The plant is new, the old one having been destroyed by fire two years ago, and is rebuilt along most approved manufacturing and hygienic lines.

Fires:—

The plant of the American Foundry & Construction Co., Pittsburg, was damaged to the extent of about $5,000 by fire April 14.

The fine wire department and stock room of the Independent Steel & Wire Co., Cuyahoga Falls, O., were seriously damaged April 13, the loss being estimated at $35,000.

The machine shop, gas engine shop, main office and storehouse of the Nichols & Langworthy Machine Co., Hope Valley, R. I., were badly damaged April 13, the loss being estimated at $175,000.

The plant of the Greensburg Foundry & Machine Co., Jeanette, Pa., was heavily damaged by fire April 14. The pattern department and auxiliary structures were saved, but the main buildings suffered much loss. The damage is placed at about $25,000.

The core room of the Pevey Foundry Co., Lowell, Mass., was damaged to the amount of $1,000 April 7, the loss being covered by insurance.

The machine shops, car shops and roundhouse of the Western Maryland railroad at Elkins, W. Va., were damaged to the amount of $10,000 April 11.

TRADE PUBLICATIONS.

TUBE AND PIPE CUTTERS.—The Fox Machine Co., Grand Rapids, Mich., has issued a new catalog of its pipe and tube cutters. In addition to the smaller sizes, which are now well known, it calls attention to its new heavy cutter, known as the No. 6, and which has a capacity up to 4½ inches outside diameter, pipe or tube. The claim is made that with this machine a 4-inch tube can be cut in 10 seconds.

ECONOMIZERS.—The B. F. Sturtevant Co., Hyde Park, Mass., in bulletins Nos. 161 and 163 describes the application of its economizers to steam plants in textile mills and steel mills and machinery manufactories, respectively. It describes the conditions under which economizers become profitable and the advantages to be gained by their use. Examples of typical installations are shown and lists of plants in which the economizers have been installed are included.

FURNACES.—The W. S. Rockwell Co., Hudson Terminal building, New York, in bulletin No. 2 describes the Rockwell rotary annealing and hardening furnace, which is designed for the uniform heat treatment of various metals which are to be either annealed or heated for hardening. It is designed for handling brass, copper, steel, iron, aluminum, gold, silver and other metals, and employs either oil or gas as fuel,

STEAM TURBINE GENERATORS.—A handsome publication devoted to the Curtis steam turbine-generator has recently been issued by the General Electric Co. under the number 4653. This bulletin is quite elaborate so far as details of construction are concerned, containing interior views and cross-sections of various parts of turbine and generator. It describes large and small turbines of vertical and horizontal types, and contains illustrations of numerous representative Curtis turbine installations. The bulletin will be found to contain much of interest to the central station manager.

"JAMISON" SELECTED FOUNDRY COKE

Not how cheap, but HOW GOOD. We respectfully submit that this question is worth the Foundryman's most serious consideration, and a saving of 15 or 25 cents per ton on the Coke may mean a totally different result in the cost of your Castings.

Improvement is the order of the day with Jamison. 60 determinations from our shipments within the past two months showed this average, viz.:

Ash 10.04, Sulphur .86

Our constant aim is to *Make Better Coke* regardless of cost. February, 1909, 72-Hour shipments of 19,000 tons, proves that our efforts are appreciated by our valued trade.

Won't you give us a chance to tell you more about this Coke?

JAMISON COAL & COKE CO.

Frick Building Annex, Pittsburg, Pa.

Bessemer Coke Company

Offices: Lewis Block PITTSBURG, PA.

Manufacturers of

CONNELLSVILLE COKE

Furnace, Foundry and Crushed Coke

CAPACITY, 100 CARS DAILY

INDIVIDUAL CARS

Mines and Ovens in Connellsville region.

Direct connections with all the railroads entering the region.

THE LAKE ERIE ORE COMPANY

IRON ORE

Rockefeller Bldg. CLEVELAND, OHIO

Lake Superior IRON ORES

E. N. BREITUNG & CO.

Rockefeller Bldg. CLEVELAND, O.

Pickands, Mather & Co.

IRON ORE

PIG IRON AND COAL

CLEVELAND, OHIO

IRON ORE. PIG IRON

Corrigan, McKinney & Co.

CLEVELAND, O.

PICKANDS, BROWN & CO.

Pig Iron, Iron Ore and Coke

CHICAGO

OGLEBAY, NORTON & CO.

LAKE SUPERIOR IRON ORES

CLEVELAND

The Tod-Stambaugh Co. IRON ORES

206 PERRY-PAYNE BUILDING

CLEVELAND, OHIO

J. J. MOHR & SON

Bullitt Bldg., Philadelphia, Pa.

PIG IRON COKE

FERRO MANGANESE FERRO SILICON

Lake Superior Charcoal Pig Iron

BRANDS

PIONEER, ANTRIM, ELK RAPIDS, CHAMPION, MARQUETTE, MICHIGAN, EXCELSIOR, PINE LAKE.

Particularly adapted for the manufacture of Car Wheels, Cylinders, Malleables and all foundry Castings, where great strength is required.

SUPERIOR CHARCOAL IRON CO.

Grand Rapids, Mich.

CRESCENT FIRE BRICK

FOR

HIGH GRADE USES

MADE FROM CLEARFIELD COUNTY CLAYS

BICKFORD FIRE BRICK CO.

1122 Farmers Bank Building,

PITTSBURG, PA.

TELEPHONE - BELL, GRANT 3144. P & A., MAIN 194

WORKS AT CURWENSVILLE, CLEARFIELD CO., PA.

McKeefrey & Co.

PIG IRON, COAL & COKE

Leetonia, Ohio

THE "CLEARFIELD" FIRE BRICK

MANUFACTURED BY

THE CLEARFIELD FIRE BRICK CO.

Office and Works at - - CLEARFIELD, PA.

WALTER-WALLINGFORD & CO.

PIG IRON & COKE

CINCINNATI PITTSBURGH

REED F. BLAIR & CO.

FRICK BUILDING,
PITTSBURG, PA.

Coke Pig Iron

Strictly Standard Connellsville Foundry

Low Phosphorus, Standard Bessemer, Malleable, Basic, Foundry, Gray Forge

Chrome Ore, Ferro-Manganese, Ferro-Silicon, Silicon-Spiegel.

NOW READY

The Latest and Most Important Contribution to Foundry Literature.

OPEN HEARTH STEEL CASTINGS

By W. M. CARR

FULLY ILLUSTRATED.

In this book are compiled the series of articles which appeared simultaneously in THE IRON TRADE REVIEW and THE FOUNDRY, on the manufacture of Open Hearth Steel Castings.

The following subjects are treated exhaustively---

¶ Selection and representative compositions of melting Stocks, Alloys, Refractories, Fuels and Molding Sands.
¶ Furnace construction and Melting Manipulation of Heats.
¶ Conditions of melting as affecting Physical Properties of Products.
¶ Analyses and Physical Tests of Different Grades of Products.
¶ Effect of Constituent Metals and Metalloids usually present in Open-Hearth Steel Castings.
¶ Heat Treatment of Castings with notes on Microscopic Examinations.
¶ Discussion of the Causes of Blow-holes, Shrinkage, Cracks, etc.
¶ Repairing Defects by Thermit Welding.

Price $1.50

BOOK DEPARTMENT

The Penton Publishing Co.

CLEVELAND

How do you figure your furnace expense and charges for refractories?
By the COST of the Brick? Or by the length of service they will give?

HARBISON-WALKER REFRACTORIES COMPANY

FIRE CLAY
SILICA
MAGNESIA
CHROME

BRICK

Are made of the highest grade raw materials, under expert supervision, in modern up-to-date works, and are worth more because better than others. They last longer and are more economical. You can PROVE this statement in your own works by sending us trial order. Information, records and prices on request.

LARGEST CAPACITY *PROMPT SHIPMENTS*

HARBISON-WALKER REFRACTORIES COMPANY, Pittsburg, Penna.

THE STOWE-FULLER COMPANY, Cleveland, O.

FIRE BRICK
"Quality, Not Quantity."

We manufacture at our own Plants the highest quality of Magnesite, Chrome, Silica, and Fire Clay Brick with personal attention of interested and expert managers. Our brands are the Highest Quality made and we would be pleased to prove this to you in actual work, as we have with others.

Six Modern Plants, - - - - - - - 200,000 Daily Capacity.

Located in Pennsylvania, Ohio, and Kentucky. The only company furnishing all grades of furnace material from their own plants.

The highest grade refractories of all kinds.

Blast Furnace Lining that stands the wear with Skip Hoists or Hand-Filled Furnaces.

Pittsburg Office 711 House Bldg.

Ashland Fire Brick Co.

Ashland, Ky.

FIRE BRICK

For all purposes

Five Large Plants

Established 1864

CAPITAL STOCK

$100,000.00

HIGH GRADE FIRE BRICK

THE SCIOTO FIRE BRICK COMPANY

Sciotoville, - Ohio

THE NILES FIRE BRICK CO.

ESTABLISHED 1872.

Manufacturers of High Grade

FIRE BRICK

Brand Niles No. 1

Blast Furnace Linings, Rolling Mill & Heating Furnaces and Malleable Furnaces a specialty

Office and Works: Niles, Ohio

JOS. SOISSON FIRE BRICK CO.

Manufacturers of High Grade Fire and Silica Brick for all purposes. Coke Oven Brick a specialty.

Main Office, Connellsville, Pa.

TRADE MARK.

LION BRAND ALLOYS & METALS

FERRO ALLOYS, METALS AND ORES

FOUNDED 1865 BY GEO. G. BLACKWELL

CHROME ORE. Blackwell's special Refractory quality for Furnace Linings.
MANGANESE ORE of every grade.
FLUOR SPAR. We are the largest mine owners in the world.
S. A. M. ALLOY. Produces sound ingots and blowhole-free castings.
FERRO PHOSPHORUS. CARBONLESS CHROMIUM METAL.
FERRO-MOLYBDENUM. Pure Molybdenum. MOLYBDENITE.
FERRO-CHROME. 60-72% Cr., % to 1% Carbon and any % up to 10%.
FERRO-TUNGSTEN 50-90%. TUNGSTEN METAL, 96-99%.
FERRO-TITANIUM, FERRO-BORON, FERRO-VANADIUM, 25 and 50%.
FERRO-SILICON, 25%, 50%, and 75%. COPPER SILICON.
PLUMBAGO, BLACKLEAD, METAL WORKERS' CRAYONS.

We make any and EVERY ALLOY AND METAL REQUIRED.
We make a SPECIAL HIGH SPEED ALLOY FOR TOOL STEEL

GEO. G. BLACKWELL, SONS & CO., Limited,
THE ALBANY, LIVERPOOL, ENG.
Manufacturers, Metallurgists, Mine Owners, Merchants.
WORKS: Garston Docks. CODES: A. B. C., Moreing & Neal, Liebers, and Western Union.
Agents in the U. S. for our
FLUOR SPAR: The Pennsylvania Salt Mfg. Co., Pittsburgh, Pa.

SECOND HAND MACHINERY

1—Egan Co. Wood Frame Dado Machine with six (6) Heads and 2 Saws; good as new.

1—5 H. P. Crocker-Wheeler, Direct Current Motor, 120 Volts, 1800 R. P. M. Good as New.

1—8″ Clement Hand Jointer or Buzz Planer.

1—Double spindle routing machine, fair condition.

1—24 in. J. A. Fay & Egan Co. No. 2 hand planer and jointer, good as new.

1—16 in. x 20 in. 100 H. P. Heavy Duty Steam Engine, entirely rebuilt.

1—7½ x 7 x 10 in. Worthington Low Service Duplex Pump with Submerged Cylinders.

1—8 x 10 in. Left-hand Chandler & Taylor Self-contained Engine.

1—15 H. P. Horizontal Engine.

1—3 in. Waters Engine Governor.

1—Houston Power Feed Panel Raiser.

1—18″ second hand shaper.

1—18″ second hand cupola blower.

We also have a full line of second-hand Woodworking Machinery.

Aumen Machinery & Supply Co.

324 N. HOLLIDAY ST. BALTIMORE, MD.

p

AIR COMPRESSORS FOR SALE

1—Ingersoll Straight Line, piston inlet, size 24″ x 26¼″ x 30″. 1650 cu. ft. per minute, 80 to 90 lbs. pressure. Steam driven.

1—Ingersoll Straight Line, piston inlet, size 22″ x 22¼″ x 24″. 950 cu. ft. per minute, 80 to 100 lbs. pressure. Steam driven.

1—Norwalk Compound, diameter steam cylinder, 20″, stroke 20″, air cylinders 13½ & 18″, capacity 950 cu. ft. per minute, 80 to 100 lbs. pressure. Steam driven.

1—Rarig, size 16″ x 16″ x 30″, Corliss valve gear, fly wheel 14′ diameter, capacity 80 R. P. M. 500 cu. ft. 100 R. P. M. 700 cu. ft. 80 to 100 lbs. pressure. Steam driven.

1—Hall Class "B" Duplex Straight Line, size 12″ x 16″ x 14″, capacity 810 cu. ft. at 40 lbs. pressure. Steam driven.

1—Hall Class "A" Straight Line, size 12″ x 18″ x 14″, 510 cu. ft. per minute at 25 lbs. pressure. Steam driven.

1—Hall Class "C" Tandem Compound Straight Line, size 14″ x 15″ x 9½″ x 14″, capacity 360 cu. ft. per minute at 100 lbs. pressure, equipped with Meyer valve. Steam driven.

1—Franklin, single, size 12″ x 12″ x 12″, capacity 240 cu. ft. 80 to 100 lbs. pressure. Steam driven.

1—Ingersoll single, size 12″ x 12″ x 12″, capacity 240 cu. ft. per minute 80 to 100 lbs. pressure. Steam driven.

1—Hall Class "H" Duplex, straight line, size 14″ x 14″, capacity 620 cu. ft. per minute, 60 to 100 lbs. pressure. Belt driven.

1—Hall Class "G," single straight line, size 10″ x 10″, capacity 130 cu. ft. per minute at 60 to 100 lbs. pressure. Belt driven.

1—American single, size 14″ x 10″, capacity 240 cu. ft. per minute 25 to 35 lbs. pressure. Belt driven.

1—Franklin, single, size 10″ x 10″, capacity 130 cu. ft. per minute at 60 to 100 lbs. pressure. Belt driven.

1—Hall Class "G," single straight line, size 9″ x 9″, capacity 88 cu. ft. 80 to 100 lbs. pressure. Belt driven.

W. R. Beatty Machinery & Equipment Company

House Building PITTSBURG, PA.

METALLURGICAL LABORATORY NOTES

By HENRY M. HOWE

Professor of Metallurgy in Columbia University.

CONTENTS

I.—Squad Experiments and Others for a Short Course in Metallurgy. II.—Pyrometry and Calorimetry. III.—Melting Points of Silicates, etc. IV.—Properties of Refractory Materials. V.—Iron and Steel. VI.—Non-Ferrous Metals. Appendix.

In this book the author describes ninety-one laboratory experiments conducted by students in the Department of Metallurgy of the School of Mines of Columbia University and dealing with Pyrometry, Calorimetry, Metallography, Heat Treatment of Steel, etc.

These notes should prove very valuable not only to the instructors and students of technical schools, but also to Metallurgists and Metallographists engaged in commercial work.

154 Pages. 44 Illustrations. Price, $2.50 Net.

Book Department, THE PENTON PUBLISHING CO. Cleveland.

METALLURGY OF CAST IRON

By Thos. D. West.

628 pages. 153 illustrations. Price $3.00.

THE author begins with a chapter relating to the manufacture of coke and carries the reader through the operations involved in blast furnace practice, showing how iron is affected by changes during its manufacture. Advice is given for purchasing and sampling iron. The elements in cast iron and their physical effects are dwelt upon, typical mixtures being shown for all classes of castings. Methods for calculating mixtures according to their chemical contents are given and the general utility of chemical analyses explained. The latter part of the book is given over to the testing of cast iron, records being appended of a number of investigations with which Mr. West has been connected. About 50 pages are devoted to selected tables of general utility to the founder.

Book Department

THE PENTON PUBLISHING COMPANY, CLEVELAND, O.

REBUILT ENGINES and BOILERS

The cleanest and most thoroughly rebuilt.

All our own and in stock. Not scattered everywhere and merely listed.

ENGINES—CORLISS:—20 x 48 Wheelock, 20 x 42 Allis, 18 x 42 Hamilton, 16 x 42 Lane & Bodley, 14 x 36 Lane & Bodley, 14 x 24 Wright, 12 x 30 Allis, etc.

ENGINES—AUTOMATIC:—16 x 32 Buckeye, 15 x 14 Erie, 14¼ x 16 Buckeye, 14½ x 14 Ball & Wood, 13½ x 15 Taylor, 13 x 16 Erie, 12 x 14 Green, 12 x 12 N. Y. Safety, 10 x 10 Fisher, 9½ x 12 Leffel, 8 x 10 Allfree, etc.

ENGINES—THROTTLING:—18 x 24 Erie, 16 x 20 Chandler & Taylor, 16 x 18 Erie, 14 x 24 Atlas, 13 x 16 Chandler & Taylor, 14 x 14 Lewis, Vertical, 10 x 16 Owens, Lane & Dyer, 10 x 12 Industrial, 9 x 12 Ajax, 8 x 12 Climax, 7 x 12 H. S. & G., 6 x 8, Clark, etc.

BOILERS—STATIONARY:—72 x 18 High Pressure, 72 x 18 Standard, 72 x 16, 66 x 16, 60 x 20, 60 x 16, 54 x 16, 54 x 14, 54 x 12, 48 x 16, 48 x 14, 44 x 14, 40 x 12, 40 x 9, 36 x 16, 36 x 10, etc.

BOILERS—FIRE BOX:—80, 60, 50, 40, 35, 30, 25, 20, 16, 12, 10 and 8 H. P., etc.

BOILERS—VERTICAL:—50, 40, 35, 30, 25, 20, 16, 12, 10, 8, 5 and 3 H. P., etc.

HEATERS:—All sizes, Open and Closed.

PUMPS:—All sizes, Single and Duplex.

LATHES:—17 x 8 Lodge & Barker; 60″ Stevens Pulley.

PLANER:—32 x 30 x 10 ft. New Haven, Single Head.

MILLER:—DUPLEX BRASS MILLER.

TOOL GRINDER:—Springfield.

SAW MILLS, LATH MILLS, EDGERS, CUT-OFF SAWS, TANKS, BLOWERS, EXHAUSTERS, etc. Write for list.

Also full assortment of new machinery.

Sole manufacturers of the celebrated "LEADER" INJECTORS and JET PUMPS. Send for circular.

THE RANDLE MACHINERY CO.
1747 Powers St.
CINCINNATI, OHIO

Refitted Machine Tools

BORING MACHINES
(2) 30 in. Bullard
(1) 37 in. Bridgeport—(1) head

DRILL PRESSES
(1) 6-spindle Quint turret
(1) 33 in. Bement-Miles

DRILL PRESSES—RADIAL
(1) 24 in. Fosdick, National type

GEAR CUTTERS
(1) Grant-Lees hobbing machine
(1) 36 in. x9 in. x5p Gould & Eberhardt
(2) 50 in. x11 in. x5p Gould & Eberhardt

GRINDERS
(1) No. 2 Brown & Sharpe Universal
(1) "A" Yankee Drill Grinder
(1) Leland & Faulconer, wet
(1) 12 in. Disc Grinder

HAMMERS
(1) 60 lb. Bradley, cushion helve

LATHES
(1) 14 in. x 6 ft. Whitcomb-Blaisdell, quick ch'ge gear, turret on shears
(1) 14 in. x 6 ft. Le Blond, quick change gear
(1) 14 in. x 6 ft. Le Blond, belt feed
(1) 14 in. x 8 ft. Flather
(1) 16 in. x 6 ft. Reed, belt feed, plain rest
(2) 16 in. x 6 ft. Lodge & Shipley quick change gear
(1) 18 in. x 6 ft. Lodge & Shipley, quick change gear
(1) 20 in. x 8 ft. Flather, comp. rest
(1) 42 in. x 10 ft. Lodge & Shipley, quick change gear
(2) 22 in. x 12 ft. Lodge & Shipley, quick change gear
(1) 22 in. x 12 ft. Walcott
(1) 24 in. x 8 ft. Flather
(1) 24 in. x 10 ft. Lodge & Barker
(2) 24 in. x 12 ft. Lodge & Shipley, quick change gear
(1) 24 in. x 16 ft. Lodge & Shipley, quick change gear
(1) 26 in. x 12 ft. Reed
(2) 27 in. x 10 ft. Lodge & Shipley, quick change gear
(1) 27 in. x 14 ft. Lodge & Shipley, quick change gear

LATHES—POLISHING
(1) No. 3 Diamond, 52 x 1 1-4 spindle
(1) No. 7G Diamond, 48 x 1 1-4 spindle

MILLING MACHINES
(1) No. 3 Brown & Sharpe Universal
(1) No. 3 Cincinnati, all feeds, plain
(1) No. 4 Cincinnati, all feeds, plain
(1) 42 in. x 24 in. x 8 ft. Ingersoll, slab

PLANERS
(1) 10 in. Bush crank
(1) 20 in. x 20 in. x 4 ft. Wheeler, 1 head
(1) 26 in. x 26 in. x 10 ft. Powell, 2 heads
(1) 36 in. x 36 in. x 10 ft. Gray, 2 heads
(1) 42 in. x 36 in. x 14 ft. Cincinnati, 2 heads

PRESSES
(1) D75 Ferracute
(1) No. 62 Toledo
(1) No. 8 Greenerd arbor

SAWS
(1) 3 1-2 in. Burr
(1) 6 in. Cochrane-Bly
(1) 6 in. Newton
(1) Miller-Falls Hack
(1) 26 in. Crescent band

SHAPERS
(1) 14 in. Lodge & Davis
(1) 16 in. Gould & Eberhardt
(1) 18 in. Steptoe
(1) 20 in. Hendey
(2) 24 in. Gould & Eberhardt
(1) 24 in. Hendey
(1) 24 in. Potter & Johnson
(1) 26 in. Cincinnati, triple geared
(1) 28 in. Hendey
(1) 32 in. Gould & Eberhardt
(1) 34 in. Walcott, shifting belt

TURRET LATHES
(1) No. 3 Bardons & Oliver
(1) No. 5 Warner & Swasey
(1) 2 in. x 24 in. Jones & Lamson
(1) 22 in. Ballard "H" machine
(1) 26 in. Universal, chuck fitted

THE MOTCH & MERRYWEATHER MACHINERY CO.
707-715 Lakeside Ave. N. W., Cleveland, Ohio
Detroit Br'ch: 1025 Majestic Bldg. Cincinnati Br'ch: 1014 1st N't'l B'k Bldg

Frogs & Switches

ALSO

LIGHT RAILS, SPLICE BARS, SPIKES & BOLTS, SWITCHSTANDS, RAIL BRACES,

Quick Shipments of Short Orders.

CAR PUSHERS, DERAILERS, HEAVY CHAIN, PLATES 12' to 36' CUT TO SKETCH.

CENTRAL TRACK SUPPLY COMPANY, Springfield, O.

FOR SALE

48 in. Rotary Planer and Cold Saw

Practically new.

Address

WM. WARD MACHINERY CO., Pittsburg, Pa.

COMPLETE ELECTRIC PLANT

Owing to dismantling of Second National Bank Building of this city, we have for sale the following fine, modern equipment:

2—75 K. W. 125 V. Westinghouse generators, direct connected to 15 x 14″ Russell single valve engines.
Complete switchboard.
1—45 K. W. outfit, same make.
2—100 H. P. Economic boilers, self contained.
Heater, pump, piping, etc.
1—12 & 18 x 11 x 18″ Compound duplex pump.
Everything as good as new at about one-half the price.

WICKES BROTHERS
PITTSBURG, PA.
45th Street and Allegheny Valley R. R.

FOR SALE

Second Hand Machinery

Metal Working.

LATHES
1—24″ x 14′ Lodge & Shipley.
1—30″ x 12′ Lodge & Shipley.
1—36″ x 12′ Lodge & Shipley.

MILLING MACHINES
1—No. 2 Brown & Sharpe, Vertical.

DRILLS
1—24″ Cincinnati.

SHAPERS
1—30″ Cincinnati, triple geared.

GRINDERS
1—No. 24 Landis, Crank Shaft.

KEYSEATERS
1—No. 0 Mitts & Merrill.

STEAM HAMMERS
1—800 lb. Chambersburg, single frame.

New Machinery

Metal Working

LATHES
3—24″ Davis Turret.

BOLT CUTTERS
1—1½″ Acme, class "A".
1—2″ Acme, class "A".

GRINDERS
1—32″ B. T. & B. Knife.

PRESSES
1—No. C—4 Ferracute.

PUMPS
1—5 x 3 x 6 National, boiler feed.
1—No. 5 Rumsey, Centrifugal.

Wood Working
1—No. 3, 30″ Buss Planer.
1—No.4 Buss double spindleShaper.
1—Advance double spindle Shaper.
1—Buss Universal Saw Table.

VONNEGUT HARDWARE CO.
101-224 E. Washington St., Indianapolis, Ind. P

FACTORY BUILDINGS FOR SALE

Having moved into our New Factory, we will dispose of the one formerly occupied, consisting of Foundry, Machine and Carpenter Shop, with Engine, Boiler and Line Shafting, Blacksmith Shop, Boiler Shop, Pattern and other Storehouses. This is a splendid opportunity for parties wishing to locate in a town with special advantages. Welland has cheap Electric Power from two companies, Natural Gas, Waterworks, Sewers, Four Railways and One Interurban Electric Road, Water Transportation via Welland Canal.

M. Beatty & Sons, Limited,
WELLAND, ONTARIO.

CLASSIFIED ADVERTISING SERVICE

Advertisements for "Positions Wanted" and "Positions Vacant" inserted at the rate of 25 cents a line. All other advertisements under classified headings 40 cents a line for each insertion

Any advertisement appearing in the liner columns of THE IRON TRADE REVIEW, will be given one insertion free of charge in PENTON'S LIST, and when such advertisement is one that would be of interest to the foundry trade, it will likewise be given one insertion free of charge in THE FOUNDRY.

POSITIONS VACANT.

FOREMAN WANTED (Age 28-35)—FIRST class all around machinist and draughtsman, familiar with pattern shop and foundry practice, also experienced in manufacturing and using pneumatic equipment. Must have an inventive mind, and A1 references. Permanent position and splendid opportunity for advancement with young aggressive manufacturing company. Address Box 445, THE IRON TRADE REVIEW, Cleveland, Ohio.

TRAVELING SALESMAN WANTED TO sell vanadium steel. Must be well acquainted with the buying trade, experienced in the manufacture and use of vanadium steel. Applications from competent, experienced men, only, will be considered. State experience, age, salary, etc. Address Box 452, THE IRON TRADE REVIEW, Cleveland, O.

IRON AND STEEL MILL WANTS SALESman with some experience in steel or allied lines for eastern Pennsylvania territory and also for New England territory. State age, experience and salary. Address Box 450, THE IRON TRADE REVIEW, Cleveland, O.

ENGINEER WANTED IN PITTSBURG district to take agency selling cranes and machinery used in steel mills and foundries. Give references and previous experience. Address Box 455, THE IRON TRADE REVIEW, Cleveland, Ohio.

FIVE OR SIX GOOD MECHANICAL draftsmen wanted for general steel works design. Apply to Chief Engineer, Cambria Steel Co., Johnstown, Pa., stating age, education, experience and salary desired.

FOUNDRY FOREMEN AND OTHERS wanted to increase their earning capacity 25 to 50 per cent by taking a course in the mixing of irons with the Milwaukee Correspondence Schools, Goldsmith Bldg., Milwaukee, Wis.

POSITIONS WANTED

POSITION WANTED BY FIRST-CLASS foundry foreman, held present position for 10 years, would like a change; 20 years' experience as foreman on all classes of light and heavy engine work, and mining machinery of all kinds. Good mixer and melter of both iron and brass. Will take charge of pattern shop in connection with foundry if so desired. Best of references as to ability; an up-to-date hustler, sober and reliable; can produce results; shop in middle west or coast preferred. Address Box 61, PENTON'S LIST, Cleveland, Ohio. p.

WANTED POSITION AS FOREMAN IN foundry, making light and medium weight gray iron castings—21 years experience in foundry, 12 years as foreman in shops making light castings. Up-to-date in cupola practice, mixing and melting iron, molding machines and handling help. Open shop preferred—can furnish references. Address Box 77 Penton's List, Cleveland, O. p.

BY SUPERINTENDENT ON ORNAMENTal iron work for buildings. Has had large experience in the shop and at the erection. Knows how to handle help, hustle and systematize work to produce best results. Willing to start on a reasonable salary. Address "Anderson," care THE IRON TRADE REVIEW, 90 West St., New York, N. Y.

POSITION WANTED BY FOREMAN PATternmaker, 20 years' experience on all classes of work, large work especially. Familiar with molding machines and metal patterns. Capable of taking charge of foundry; 8 years superintendent of pattern department and foundry. Steady, sober and reliable, practical mechanic in both trades. Best of references. Address Box 80, PENTON'S LIST, Clevland, O. p.

AS MANAGER OR SUPERINTENDENT of gray iron foundry. Up to date in modern practice, mixtures, molding machines and economic appliances. Address Box 454, THE IRON TRADE REVIEW, Cleveland, O.

BY YOUNG MARRIED MAN, THIRTYtwo, with clean record and four successful, practical and official years in malleable and gray iron foundry. Good correspondent and executive ability. Can take charge of office and show results; can furnish highest of references from present employers and others. Address Box 448, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED AS SUPERINTENDent of malleable plant—can build furnaces, annealing ovens and core ovens and operate same successfully. Have had 14 years experience as foreman and superintendent of malleable and agricultural grey iron shops. Can give the best of references. Address Box 75 PENTON'S LIST, Cleveland, O. p.

BY YOUNG MARRIED MAN, FORMERly purchasing agent for large railway equipment company, especially experienced in buying iron and steel and their products, also other material used in manufacturing railway equipment. Thoroughly familiar with trade. Can systematize detail work. Address Box 437, THE IRON TRADE REVIEW, Cleveland, O.

AS FOUNDRY FOREMAN BY YOUNG man. Thorough knowledge of economic production of light and medium weight castings. Can handle men to best advantage, understand mixing iron by analysis or fracture. Acquainted with cost system in foundry. Can furnish references of ability. Address Box 443, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED BY A MARRIED man 35 years of age, practical molder and machinist—have held executive position as both—thoroughly up-to-date in all branches and capable of taking entire charge of shop. Address Box 74 PENTON'S LIST, Cleveland, O. p.

AS SUPERINTENDENT OR FOREMAN by a practical machinist, 18 years' experience jobbing and specialty work. Can also estimate from drawings. Can furnish references from present employers and others. Address Box 432, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED BY FOUNDRY foreman. Can take care of any kind of work. Married and sober. Would like to put a little money in a small foundry. Address Box 78, PENTON'S LIST, Cleveland, O. p.

BUSINESS OPPORTUNITIES.

AN UP-TO-DATE FOUNDRYMAN WISHes to correspond with firm considering the installation of steel converter—will furnish list of the cost of equipment and installation and the manufacture of steel, with view of taking stock. Address Box 79 Penton's List, Cleveland, O. p.

WANTED, PROPOSITION BY A MALleable iron foundry on complete journal box equipment, including molding machines, patterns and green sand core boxes. Address Box 453, THE IRON TRADE REVIEW, Cleveland, Ohio.

AN UP-TO-DATE FOUNDRY AND MAchine shop for sale, completely equipped, in daily operation with profit. Located in one of the best towns in Oklahoma, with excellent shipping facilities. Best of reasons for selling. Information cheerfully furnished. Address Business Opportunity, care PENTON'S LIST, Cleveland, O. p.

EXCELLENT WATER POWER AND FACtory site for rent or sale. Good town of 1500. Cheap help plentiful. Address Merritt Mfg. Co., Constantine, Mich. p.

WANTED BY THE ENSLEY MACHINE & Foundry Co. a good specialty in gray iron, excellent position to reach southern trade. Ensley, Alabama. p.

ENGINE FOR SALE.

FOR SALE—250 H. P. CORLISS ENGINE. Address J. C. 249 Elm St., Buffalo, N. Y. p.

FOR SALE—ONE 23 X 60 SINGLE CYLinder, double acting, Harris Corliss, pendulum ball governor, with section cast iron fly wheel, 18 ft. x 38". Good order, requirements changed, electric power being used. Address Almond Mfg. Co., Ashburnham, Mass. p.

FOR SALE—ONE 25 TO 30 H. P. GAS or gasolene engine, in fine condition, with friction clutch pulley—also muffler and gas reservoir—would take a 10 or 12 H. P. gasolene engine in exchange if up-to-date. A. W. Grandon, North Fairfield, O. p.

WASHERS "SPECIAL SIZES."

In any quantity, metal or fibre. Dies, Stamping and Screw Machine Work. Quadriga Mfg. Co., 18 So. Canal St., Chicago, Ill. p.

FOR SALE—MISCELLANEOUS.

BOILER FEED WATER PURIFIER FOR sale. Sole rights of patent just granted by the U. S. Mechanical device for the prevention of scale in steam boilers, which saves from 15 to 50 per cent of fuel, together with many other advantages, and which should become universally used, and be a great money maker. Simple, durable and inexpensive. Blue prints and all information furnished. Address "Inventor," 718 Pennsylvania building, Philadelphia, Pa.

ROD MILL FOR SALE. TWO HIGH duty engines, Porter Allen and Filer & Stowell, a number of pumps, Whiting crane, steam pipes, rope sheaves, etc. This material is in good second-hand condition. Will sell at a bargain the entire or separate. We are headquarters for relaying rails. The Isaac Joseph Iron Co., of Chicago, 1247 First Natl. Bank Bldg, Chicago, Ill. p.

FOR SALE: TABOR VIBRATOR MOLDing machine, 7" power rammer, cost $290. Make us an offer. Chicago Hardware Foundry Co., North Chicago, Ill. p.

AGENCY WANTED.

OFFICE FACILITIES IN PHILADELPHIA, Pa. Having surplus office room in the Pennsylvania building, which is the best office building and location in Philadelphia, we can represent anything in the iron, steel, metal or machinery line, all of which we are familiar with for the past 30 years. Can solicit business and attend to correspondence at this end at a moderate cost to the principals. Address promptly, Office 718, Pennsylvania building, Philadelphia, Pa.

PACIFIC COAST AGENCY WANTED for iron and steel specialties, also light structural shapes. Cold rolled steel and merchant bars. Address Girvin & Eyre, San Francisco, Cal. p.

SCRAP WANTED.

TAKE NOTICE. WE ARE BUYERS OF all grades of scrap metals, such as scrap copper, brass, lead, babbitt metals, factory metal skimmings, drosses, metal clippings, spelter, etc. Advise quality and quantity you have on hand to offer and we will name best prices f. o. b. your city. H. Kander & Co., Bowling Green, Ohio.

WANTED, MISCELLANEOUS.

WANTED SECOND-HAND MACHINERY. One 72-inch Boring and Turning Mill. One 48-inch Geared Head Engine Lathe, both must be good make and in good condition. Send cuts with full description of machine and price with your reply. The Champion Iron Co., Kenton, O. p.

A NUMBER OF ROCK-OVER MACHINES wanted (Tabor preferred). State lowest cash price, advising size, draft, and when purchased. Address Box 447, THE IRON TRADE REVIEW, Cleveland, O.